SS 03 Quantitative Methods: Application

Answers

Question #1 of 193

Question ID: 413226

Assume an investor purchases a stock for $50. One year later, the stock is worth $60. After one more year, the stock price has fallen to the original price of $50. Calculate the continuously compounded return for year 1 and year 2.

		Year 1	Year 2
✓	**A)**	18.23%	-18.23%
✗	**B)**	-18.23%	-18.23%
✗	**C)**	18.23%	16.67%

Explanation

Given a holding period return of R, the continuously compounded rate of return is: ln(1 + R) = ln($Price_1$/$Price_0$). Here, if the stock price increases to $60, r = ln(60/50) = 0.18232, or **18.23%**.

Note: Calculator keystrokes are as follows. First, obtain the result of 60/50, or 1. On the TI BA II Plus, enter 1.20 and then click on LN. On the HP12C, 1.2 [ENTER] g [LN] (the LN appears in blue on the %T key).

The return for year 2 is ln(50/60), or ln(0.833) = *negative* 18.23%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #2 of 193

Question ID: 434210

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373

The approximate 99% confidence interval for the population mean based on a sample of 60 returns with a mean of 7% and a sample standard deviation of 25% is *closest* to:

✗ **A)** 0.546% to 13.454%.
✓ **B)** -1.584% to 15.584%.
✗ **C)** 1.584% to 14.584%.

Explanation

The standard error for the mean = s / $(n)^{0.5}$ = 25% / $(60)^{0.5}$ = 3.227%. The critical value from the t-table should be based on 60 − 1 = 59 df. Since the standard tables do not provide the critical value for 59 df the closest available value is for 60 df. This leaves us with an approximate confidence interval. Based on 99% confidence and df = 60, the critical t-value is 2.660. Therefore the 99% confidence interval is approximately: 7% ± 2.660(3.227) or 7% ± 8.584% or -1.584% to 15.584%.

If you use a z-statistic, the confidence interval is 7% ± 2.58(3.227) = -1.326% to 15.326%, which is closest to the correct choice.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #3 of 193

Question ID: 434204

Assume 30% of the CFA candidates have a degree in economics. A random sample of three CFA candidates is selected. What is the probability that none of them has a degree in economics?

✗ **A)** 0.027.
✓ **B)** 0.343.
✗ **C)** 0.900.

Explanation

The probability of 0 successes in 3 trials is: [3! / (0!3!)] $(0.3)^0$ $(0.7)^3$ = 0.343

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #4 of 193

Question ID: 413257

If the true mean of a population is 16.62, according to the central limit theorem, the mean of the distribution of sample means, for all possible sample sizes n will be:

✗ **A)** 16.62 / √n.

✗ **B)** indeterminate for sample with n < 30.

✓ **C)** 16.62.

Explanation

According to the central limit theorem, the mean of the distribution of sample means will be equal to the population mean. n > 30 is only required for distributions of sample means to approach normal distribution.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #5 of 193

Question ID: 413312

An article in a trade journal suggests that a strategy of buying the seven stocks in the S&P 500 with the highest earnings-to-price ratio at the end of the calendar year and holding them until March 20 of the following year produces significant trading profits. Upon reading further, you discover that the study is based on data from 1993 to 1997, and the earnings-to-price ratio is calculated using the stock price on December 31 of each year and the annual reported earnings per share for that year. Which of the following biases is *least likely* to influence the reported results?

✗ **A)** Time-period bias.

✓ **B)** Survivorship bias.

✗ **C)** Look-ahead bias.

Explanation

Survivorship bias is not likely to significantly influence the results of this study because the authors looked at the stocks in the S&P 500 at the beginning of the year and measured performance over the following three months. Look-ahead bias could be a problem because earnings-price ratios are calculated and the trading strategy implemented at a time before earnings are actually reported. Finally, the study is conducted over a relatively short time period during the long bull market of the 1990s. This suggests the results may be time-specific and the result of time-period bias.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #6 of 193

Question ID: 413212

The mean and standard deviation of returns on three portfolios are listed below in percentage terms:

- Portfolio X: Mean 5%, standard deviation 3%.
- Portfolio Y: Mean 14%, standard deviation 20%.
- Portfolio Z: Mean 19%, standard deviation 28%.

Using Roy's safety first criteria and a threshold of 3%, which of these is the optimal portfolio?

✗ **A)** Portfolio Z.

✗ **B)** Portfolio Y.

✓ **C)** Portfolio X.

Explanation

According to the safety-first criterion, the optimal portfolio is the one that has has the largest value for the SFRatio (mean − threshold) / standard deviation.

For Portfolio X, (5 − 3) / 3 = 0.67.
For Portfolio Y, (14 - 3) / 20 = 0.55.
For Portfolio Z, (19 - 3) / 28 = 0.57.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #7 of 193

Question ID: 413234

Joan Biggs, CFA, acquires a large database of past returns on a variety of assets. Biggs then draws random samples of sets of returns from the database and analyzes the resulting distributions. Biggs is engaging in:

✗ **A)** discrete analysis.

✓ **B)** historical simulation.

✗ **C)** Monte Carlo simulation.

Explanation

This is a typical example of historical simulation.

References

Question From: Session 3 > Reading 10 > LOS r

Related Material:

- Key Concepts by LOS

Question #8 of 193

Question ID: 413278

Which of the following statements about confidence intervals is *least* accurate? A confidence interval:

- ✓ **A)** expands as the probability that a point estimate falls within the interval decreases.
- ✗ **B)** has a significance level that is equal to one minus the degree of confidence.
- ✗ **C)** is constructed by adding and subtracting a given amount from a point estimate.

Explanation

A confidence interval contracts as the probability that a point estimate falls within the interval decreases.

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #9 of 193

Question ID: 710142

Consider a random variable X that follows a continuous uniform distribution: $7 \le X \le 20$. Which of the following statements is *least* accurate?

- ✗ **A)** F(10) = 0.23.
- ✗ **B)** F(12 ≤ X ≤ 16) = 0.307.
- ✓ **C)** F(21) = 0.00.

Explanation

F(21) = 1.00. For a cumulative distribution function, the expression F(x) refers to the probability of an outcome less than or equal to x. In this distribution all the possible outcomes are between 7 and 20. Therefore the probability of an outcome less than or equal to 21 is 100%.

The other choices are true.

- $F(10) = (10 - 7) / (20 - 7) = 3 / 13 = 0.23$
- $F(12 \le X \le 16) = F(16) - F(12) = [(16 - 7) / (20 - 7)] - [(12 - 7) / (20 - 7)] = 0.692 - 0.385 = 0.307$

References

Question From: Session 3 > Reading 10 > LOS i

Related Material:

- Key Concepts by LOS

Question #10 of 193

Question ID: 413259

Frank Grinder is trying to introduce sampling into the quality control program of an old-line manufacturer. Grinder samples 38 items and finds that the standard deviation in size is 0.019 centimeters. What is the standard error of the sample mean?

- ☓ **A)** 0.00204.
- ✓ **B)** 0.00308.
- ☓ **C)** 0.00615.

Explanation

If we do not know the standard deviation of the population (in this case we do not), then we estimate the standard error of the sample mean = the standard deviation of the sample / the square root of the sample size = 0.019 / √38 = 0.00308 centimeters.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #11 of 193

Question ID: 413293

The average U.S. dollar/Euro exchange rate from a sample of 36 monthly observations is $1.00/Euro. The population variance is 0.49. What is the 95% confidence interval for the mean U.S. dollar/Euro exchange rate?

- ☓ **A)** $0.8075 to $1.1925.
- ✓ **B)** $0.7713 to $1.2287.
- ☓ **C)** $0.5100 to $1.4900.

Explanation

The population *standard deviation* is the square root of the variance (√0.49 = 0.7). Because we know the population standard deviation, we use the z-statistic. The z-statistic reliability factor for a 95% confidence interval is 1.960. The confidence interval is $1.00 ± 1.960($0.7 / √36) or $1.00 ± $0.2287.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #12 of 193

Question ID: 413186

Which of the following would *least likely* be categorized as a multivariate distribution?

- ☓ **A)** The returns of the stocks in the DJIA.

✗ **B)** The return of a stock and the return of the DJIA.

✓ **C)** The days a stock traded and the days it did not trade.

Explanation

The number of days a stock traded and did not trade describes only one random variable. Both of the other cases involve two or more random variables.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #13 of 193

Question ID: 413137

A probability distribution is *least likely* to:

✗ **A)** contain all the possible outcomes.

✗ **B)** have only non-negative probabilities.

✓ **C)** give the probability that the distribution is realistic.

Explanation

The probability distribution may or may not reflect reality. But the probability distribution must list all possible outcomes, and probabilities can only have non-negative values.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #14 of 193

Question ID: 413158

Which of the following could be the set of all possible outcomes for a random variable that follows a binomial distribution?

✗ **A)** (-1, 0, 1).

✓ **B)** (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11).

✗ **C)** (1, 2).

Explanation

This reflects a basic property of binomial outcomes. They take on whole number values that must start at zero up to the upper limit *n*. The upper limit in this case is 11.

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #15 of 193

Question ID: 413147

Which of the following could *least likely* be a probability function?

✓ **A)** X:(1,2,3,4) p(x) = 0.2.

✗ **B)** X:(1,2,3,4) p(x) = x / 10.

✗ **C)** X:(1,2,3,4) p(x) = (x × x) / 30.

Explanation

In a probability function, the sum of the probabilities for all of the outcomes must equal one. Only one of the probability functions in these answers fails to sum to one.

References

Question From: Session 3 > Reading 10 > LOS c

Related Material:

- Key Concepts by LOS

Question #16 of 193

Question ID: 413287

The table below is for five samples drawn from five separate populations. The far left columns give information on the population distribution, population variance, and sample size. The right-hand columns give three choices for the appropriate tests: Z = *z*-statistic, and t = *t*-statistic. "None" means that a test statistic is not available.

Sampling From			*Test Statistic Choices*		
Distribution	*Variance*	*n*	*One*	*Two*	*Three*
Normal	5.60	75	Z	Z	Z
Non-normal	n/a	45	Z	*t*	*t*
Normal	n/a	1000	Z	*t*	*t*
Non-normal	14.3	15	*t*	none	*t*
Normal	0.056	10	Z	Z	*t*

Which set of test statistic choices (One, Two, or Three) matches the correct test statistic to the sample for all five samples?

✓ **A)** Two.

✗ **B)** One.

✗ **C)** Three.

Explanation

For the exam: *COMMIT THE FOLLOWING TABLE TO MEMORY!*

When you are sampling from a:	and the sample size is **small**, use a:	and the sample size is **large**, use a:
Normal distribution with a *known* variance	*Z*-statistic	*Z*-statistic
Normal distribution with an *unknown* variance	*t*-statistic	*t*-statistic
Nonnormal distribution with a *known* variance	not available	*Z*-statistic
Nonnormal distribution with an *unknown* variance	not available	*t*-statistic

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #17 of 193

Question ID: 413190

The mean return of a portfolio is 20% and its standard deviation is 4%. The returns are normally distributed. Which of the following statements about this distribution are *least* accurate? The probability of receiving a return:

✗ **A)** of less than 12% is 0.025.

✓ **B)** in excess of 16% is 0.16.

✗ **C)** between 12% and 28% is 0.95.

Explanation

The probability of receiving a return greater than 16% is calculated by adding the probability of a return between 16% and 20% (given a mean of 20% and a standard deviation of 4%, this interval is the left tail of one standard deviation from the mean, which includes 34% of the observations.) to the area from 20% and higher (which starts at the mean and increases to infinity and includes 50% of the observations.) The probability of a return greater than 16% is 34 + 50 = 84%.

Note: 0.16 is the probability of receiving a return *less* than 16%.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #18 of 193

Question ID: 413224

Given a holding period return of R, the continuously compounded rate of return is:

- ✗ **A)** $e^R - 1$.
- ✓ **B)** ln(1 + R).
- ✗ **C)** ln(1 − R) − 1.

Explanation

This is the formula for the continuously compounded rate of return.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #19 of 193

Question ID: 413316

A research paper that reports finding a profitable trading strategy without providing any discussion of an economic theory that makes predictions consistent with the empirical results is *most likely* evidence of:

- ✗ **A)** a sample that is not large enough.
- ✗ **B)** a non-normal population distribution.
- ✓ **C)** data mining.

Explanation

Data mining occurs when the analyst continually uses the same database to search for patterns or trading rules until he finds one that *works*. If you are reading research that suggests a profitable trading strategy, make sure you heed the following warning signs of data mining:

Evidence that the author used many variables (most unreported) until he found ones that were significant.

The lack of any economic theory that is consistent with the empirical results.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #20 of 193

Question ID: 434206

The safety-first criterion focuses on:

- ✗ **A)** SEC regulations.
- ✓ **B)** shortfall risk.
- ✗ **C)** margin requirements.

Explanation

The safety-first criterion focuses on shortfall risk which is the probability that a portfolio's value or return will fall below a given threshold level. The safety-first criterion minimizes the probability of falling below the threshold level or return.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #21 of 193

Question ID: 413164

A stock priced at $20 has an 80% probability of moving up and a 20% probability of moving down. If it moves up, it increases by a factor of 1.05. If it moves down, it decreases by a factor of 1/1.05. What is the expected stock price after two successive periods?

- ✗ **A)** $22.05.
- ✓ **B)** $21.24.
- ✗ **C)** $20.05.

Explanation

If the stock moves up twice, it will be worth $20 × 1.05 × 1.05 = $22.05. The probability of this occurring is 0.80 × 0.80 = 0.64. If the stock moves down twice, it will be worth $20 × (1/1.05) × (1/1.05) = $18.14. The probability of this occurring is 0.20 × 0.20 = 0.04. If the stock moves up once and down once, it will be worth $20 × 1.05 × (1/1.05) = $20.00. This can occur if either the stock goes up then down or down then up. The probability of this occurring is 0.80 × 0.20 + 0.20 × 0.80 = 0.32. Multiplying the potential stock prices by the probability of them occurring provides the expected stock price: ($22.05 × 0.64) + ($18.14 × 0.04) + ($20.00 × 0.32) = $21.24.

References

Question From: Session 3 > Reading 10 > LOS g

Related Material:

- Key Concepts by LOS

Question #22 of 193

Question ID: 413166

A total return index begins the year at 1350.23 and ends the year at 1412.95. A portfolio that tracks this index earns a total return of 3.65% for the year. The tracking error of this portfolio is *closest* to:

✓ **A)** -1.0%.
✗ **B)** 4.7%.
✗ **C)** 0.9%.

Explanation

The return for the index is 1412.95 / 1350.23 − 1 = 4.65%. Tracking error is 3.65% − 4.65% = -1.00%.

References

Question From: Session 3 > Reading 10 > LOS h

Related Material:

- Key Concepts by LOS

Question #23 of 193

Question ID: 413142

A random variable that has a countable number of possible values is called a:

✗ **A)** continuous random variable.
✗ **B)** probability distribution.
✓ **C)** discrete random variable.

Explanation

A discrete random variable is one for which the number of possible outcomes are countable, and for each possible outcome, there is a measurable and positive probability. A continuous random variable is one for which the number of outcomes is not countable.

References

Question From: Session 3 > Reading 10 > LOS b

Related Material:

- Key Concepts by LOS

Question #24 of 193

Question ID: 652911

Cumulative Z-Table

z	0.05	0.06	0.07	0.08	0.09
2.4	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9970	0.9971	0.9972	0.9973	0.9974

The average return on the Russell 2000 index for 121 monthly observations was 1.5%. The population standard deviation is assumed to be 8.0%. What is a 99% confidence interval for the mean monthly return on the Russell 2000 index?

- ✓ **A)** -0.4% to 3.4%.
- ✗ **B)** 0.1% to 2.9%.
- ✗ **C)** -6.5% to 9.5%.

Explanation

Because we know the population standard deviation, we use the z-statistic. The z-statistic reliability factor for a 99% confidence interval is 2.575. The confidence interval is 1.5% ± 2.575[(8.0%)/√121] or 1.5% ± 1.9%.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #25 of 193

Question ID: 413146

If a smooth curve is to represent a probability density function, what two requirements must be satisfied? The area under the curve must be:

- ✓ **A)** one and the curve must not fall below the horizontal axis.
- ✗ **B)** one and the curve must not rise above the horizontal axis.
- ✗ **C)** zero and the curve must not fall below the horizontal axis.

Explanation

If a smooth curve is to represent a probability density function, the total area under the curve must be one (probability of all outcomes equals 1) and the curve must not fall below the horizontal axis (no outcome can have a negative chance of occurring).

References

Question From: Session 3 > Reading 10 > LOS c

Related Material:

- Key Concepts by LOS

Question #26 of 193

Question ID: 413238

An analyst wants to generate a simple random sample of 500 stocks from all 10,000 stocks traded on the New York Stock Exchange, the American Stock Exchange, and NASDAQ. Which of the following methods is *least likely* to generate a random sample?

✓ **A)** Using the 500 stocks in the S&P 500.

✗ **B)** Listing all the stocks traded on all three exchanges in alphabetical order and selecting every 20th stock.

✗ **C)** Assigning each stock a unique number and generating a number using a random number generator. Then selecting the stock with that number for the sample and repeating until there are 500 stocks in the sample.

Explanation

The S&P 500 is not a random sample of all stocks traded in the U.S. because it represents the 500 largest stocks. The other two choices are legitimate methods of selecting a simple random sample.

References

Question From: Session 3 > Reading 11 > LOS a

Related Material:

- Key Concepts by LOS

Question #27 of 193

Question ID: 413317

The practice of repeatedly using the same database to search for patterns until one is found is called:

✓ **A)** data mining.

✗ **B)** data snooping.

✗ **C)** sample selection bias.

Explanation

The practice of data mining involves analyzing the same data so as to detect a pattern, which may not replicate in other data sets, also known as torturing the data until it confesses.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #28 of 193

Question ID: 413145

In a continuous probability density function, the probability that any single value of a random variable occurs is equal to what?

- ✓ **A)** Zero.
- ✗ **B)** 1/N.
- ✗ **C)** One.

Explanation

Since there are infinite potential outcomes in a continuous pdf, the probability of any single value of a random variable occurring is 1/infinity = 0.

References

Question From: Session 3 > Reading 10 > LOS c

Related Material:

- Key Concepts by LOS

Question #29 of 193

Question ID: 434219

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373

The average salary for a sample of 61 CFA charterholders with 10 years experience is $200,000, and the sample standard deviation is $80,000. Assume the population is normally distributed. Which of the following is a 99% confidence interval for the population mean salary of CFA charterholders with 10 years of experience?

- ✗ **A)** $172,514 to $227,486.
- ✓ **B)** $172,754 to $227,246.
- ✗ **C)** $160,000 to $240,000.

Explanation

If the distribution of the population is *normal*, but we *don't know* the population variance, we can use the Student's t-distribution to construct a confidence interval. Because there are 61 observations, the degrees of freedom are 60. From the student's t table, we can determine that the reliability factor for $t_{\alpha/2}$, or $t_{0.005}$, is 2.660. Then the 99% confidence interval is $200,000 ± 2.660($80,000 / √61) or $200,000 ± 2.660 × $10,243, or $200,000 ± $27,246.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #30 of 193

Question ID: 413251

Which of the following statements regarding the central limit theorem (CLT) is *least* accurate? The CLT:

✓ **A)** states that for a population with mean μ and variance σ^2, the sampling distribution of the sample means for any sample of size n will be approximately normally distributed.

✗ **B)** holds for any population distribution, assuming a large sample size.

✗ **C)** gives the variance of the distribution of sample means as σ^2 / n, where σ^2 is the population variance and n is the sample size.

Explanation

This question is asking you to select the inaccurate statement. The CLT states that for a population with mean μ and a finite variance σ^2, the sampling distribution of the sample means becomes approximately normally distributed *as the sample size becomes large*. The other statements are accurate.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #31 of 193

Question ID: 413185

A multivariate distribution:

✗ **A)** gives multiple probabilities for the same outcome.

✗ **B)** applies only to binomial distributions.

✓ **C)** specifies the probabilities associated with groups of random variables.

Explanation

This is the definition of a multivariate distribution.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #32 of 193

Question ID: 413228

Over a period of one year, an investor's portfolio has declined in value from 127,350 to 108,427. What is the continuously compounded rate of return?

- ✗ **A)** -13.84%.
- ✓ **B)** -16.09%.
- ✗ **C)** -14.86%.

Explanation

The continuously compounded rate of return = ln(S_1 / S_0) = ln(108,427 / 127,350) = -16.09%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #33 of 193

Question ID: 413315

The average mutual fund return calculated from a sample of funds with significant survivorship bias would *most likely* be:

- ✓ **A)** larger than the mean return of the population of all mutual funds.
- ✗ **B)** smaller than the mean return of the population of all mutual funds.
- ✗ **C)** an unbiased estimate of the mean return of the population of all mutual funds if the sample size was large enough.

Explanation

If we try to draw any conclusions from an analysis of a mutual fund database with survivorship bias, we overestimate the average mutual fund return, because we don't include the poorer-performing funds that dropped out. A larger sample size from a database with survivorship bias will still result in a biased estimate.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #34 of 193

Question ID: 413208

Which of the following portfolios provides the best "safety first" ratio if the minimum acceptable return is 6%?

Portfolio	Expected Return (%)	Standard Deviation (%)
1	13	5
2	11	3
3	9	2

- ✗ **A)** 1.
- ✓ **B)** 2.
- ✗ **C)** 3.

Explanation

Roy's safety-first criterion requires the maximization of the SF Ratio:
SF Ratio = (expected return - threshold return) / standard deviation

Portfolio	Expected Return (%)	Standard Deviation (%)	SF Ratio
1	13	5	1.40
2	11	3	1.67
3	9	2	1.50

Portfolio #2 has the highest safety-first ratio at 1.67.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #35 of 193

Question ID: 413242

A sample of five numbers drawn from a population is (5, 2, 4, 5, 4). Which of the following statements concerning this sample is *most* accurate?

- ✗ **A)** The sampling error of the sample is equal to the standard error of the sample.
- ✗ **B)** The mean of the sample is ∑X / (n − 1) = 5.
- ✓ **C)** The variance of the sample is: $\sum(x_1 - \text{mean of the sample})^2 / (n - 1) = 1.5$.

Explanation

The mean of the sample is ∑X / n = 20 / 5 = 4. The sampling error of the sample is the difference between a sample statistic and its corresponding population parameter.

References

Question From: Session 3 > Reading 11 > LOS b

Related Material:

- Key Concepts by LOS

Question #36 of 193

Question ID: 413167

A portfolio begins the year with a value of $100,000 and ends the year with a value of $95,000. The manager's performance is measured against an index that declined by 7% on a total return basis during the year. The tracking error of this portfolio is *closest* to:

✗ **A)** −5%.

✗ **B)** −2%.

✓ **C)** 2%.

Explanation

Tracking error is the portfolio total return minus the benchmark total return. The portfolio return is ($95,000 − $100,000) / $100,000 = −5%. Tracking error = −5% − (−7%) = +2%.

References

Question From: Session 3 > Reading 10 > LOS h

Related Material:

- Key Concepts by LOS

Question #37 of 193

Question ID: 413241

Which of the following statements about sampling errors is *least* accurate?

✓ **A)** Sampling errors are errors due to the wrong sample being selected from the population.

✗ **B)** Sampling error is the error made in estimating the population mean based on a sample mean.

✗ **C)** Sampling error is the difference between a sample statistic and its corresponding population parameter.

Explanation

Sampling error is the difference between a sample statistic (the mean, variance, or standard deviation of the sample) and its corresponding population parameter (the mean, variance, or standard deviation of the population).

References

Question From: Session 3 > Reading 11 > LOS b

Related Material:

- Key Concepts by LOS

Question #38 of 193

Question ID: 413248

An analyst is asked to calculate standard deviation using monthly returns over the last five years. These data are *best* described as:

- ✓ **A)** time series data.
- ✗ **B)** cross-sectional data.
- ✗ **C)** systematic sampling data.

Explanation

Time series data are taken at equally spaced intervals, such as monthly, quarterly, or annual. Cross sectional data are taken at a single point in time. An example of cross-sectional data is dividend yields on 500 stocks as of the end of a year.

References

Question From: Session 3 > Reading 11 > LOS d

Related Material:

- Key Concepts by LOS

Question #39 of 193

Question ID: 413196

If a stock's return is normally distributed with a mean of 16% and a standard deviation of 50%, what is the probability of a negative return in a given year?

- ✓ **A)** 0.3745.
- ✗ **B)** 0.5000.
- ✗ **C)** 0.0001.

Explanation

The selected random value is standardized (its z-value is calculated) by subtracting the mean from the selected value and dividing by the standard deviation. This results in a z-value of $(0 - 16) / 50 = -0.32$. Changing the sign and looking up +0.32 in the z-value table yields 0.6255 as the probability that a random variable is to the right of the standardized value (i.e. more than zero). Accordingly, the probability of a random variable being to the left of the standardized value (i.e. less than zero) is $1 - 0.6255 = 0.3745$.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #40 of 193

Question ID: 413204

The standard normal distribution is *most* completely described as a:

- ✗ **A)** symmetrical distribution with a mean equal to its median.
- ✗ **B)** distribution that exhibits zero skewness and no excess kurtosis.
- ✓ **C)** normal distribution with a mean of zero and a standard deviation of one.

Explanation

The standard normal distribution is defined as a normal distribution that has a mean of zero and a standard deviation of one. The other choices apply to any normal distribution.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #41 of 193

Question ID: 413207

The mean and standard deviation of returns for three portfolios are listed below in percentage terms.

Portfolio X: Mean 5%, standard deviation 3%.
Portfolio Y: Mean 14%, standard deviation 20%.
Portfolio Z: Mean 19%, standard deviation 28%.

Using Roy's safety-first criteria and a threshold of 4%, select the optimal portfolio.

- ✗ **A)** Portfolio X.
- ✗ **B)** Portfolio Y.
- ✓ **C)** Portfolio Z.

Explanation

Portfolio Z has the largest value for the SFRatio: (19 − 4) / 28 = 0.5357.

For Portfolio X, the SFRatio is (5 - 4) / 3 = 0.3333.
For Portfolio Y, the SFRatio is (14 - 4) / 20 = 0.5000.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #42 of 193

Question ID: 413314

A study reports that from 2002 to 2004 the average return on growth stocks was twice as large as that of value stocks. These results *most likely* reflect:

- ✗ **A)** survivorship bias.
- ✗ **B)** look-ahead bias.
- ✓ **C)** time-period bias.

Explanation

Time-period bias can result if the time period over which the data is gathered is either too short because the results may reflect phenomenon specific to that time period, or if a change occurred during the time frame that would result in two different return distributions. In this case the time period sampled is probably not large enough to draw any conclusions about the long-term relative performance of value and growth stocks, even if the sample size within that time period is large.

Look-ahead bias occurs when the analyst uses historical data that was not publicly available at the time being studied. Survivorship bias is a form of sample selection bias in which the observations in the sample are biased because the elements of the sample that *survived* until the sample was taken are different than the elements that dropped out of the population.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #43 of 193

Question ID: 413260

Joseph Lu calculated the average return on equity for a sample of 64 companies. The sample average is 0.14 and the sample standard deviation is 0.16. The standard error of the mean is *closest* to:

- ✗ **A)** 0.0025.
- ✗ **B)** 0.1600.
- ✓ **C)** 0.0200.

Explanation

The standard error of the mean = $\sigma/\sqrt{n} = 0.16/\sqrt{64} = 0.02$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #44 of 193

Question ID: 413300

A local high school basketball team had 18 home games this season and averaged 58 points per game. If we assume that the number of points made in home games is normally distributed, which of the following is *most likely* the range of points for a confidence interval of 90%?

- ✗ **A)** 26 to 80.
- ✗ **B)** 24 to 78.
- ✓ **C)** 34 to 82.

Explanation

This question has a bit of a trick. To answer this question, remember that the mean is at the midpoint of the confidence interval. The correct confidence interval will have a midpoint of 58. (34 + 82) / 2 = 58.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #45 of 193

Question ID: 413295

A traffic engineer is trying to measure the effects of carpool-only lanes on the expressway. Based on a sample of 1,000 cars at rush hour, he finds that the mean number of occupants per car is 2.5, with a standard deviation of 0.4. Assuming that the population is normally distributed, what is the confidence interval at the 5% significance level for the number of occupants per car?

- ✓ **A)** 2.475 to 2.525.
- ✗ **B)** 2.288 to 2.712.
- ✗ **C)** 2.455 to 2.555.

Explanation

The Z-score corresponding with a 5% significance level (95% confidence level) is 1.96. The confidence interval is equal to: $2.5 \pm 1.96(0.4 / \sqrt{1,000}) = 2.475$ to 2.525. (We can use Z-scores because the size of the sample is so large.)

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #46 of 193

Question ID: 413281

When is the t-distribution the appropriate distribution to use? The t-distribution is the appropriate distribution to use when constructing confidence intervals based on:

- ✗ **A)** small samples from populations with known variance that are at least approximately normal.
- ✓ **B)** small samples from populations with unknown variance that are at least approximately normal.
- ✗ **C)** large samples from populations with known variance that are nonnormal.

Explanation

The t-distribution is the appropriate distribution to use when constructing confidence intervals based on small samples from populations with unknown variance that are either normal or approximately normal.

References

Question From: Session 3 > Reading 11 > LOS i

Related Material:

- Key Concepts by LOS

Question #47 of 193

Question ID: 413133

Which of the following statements about probability distributions is *most* accurate?

- ✗ **A)** A discrete uniform random variable has varying probabilities for each outcome that total to one.
- ✓ **B)** A binomial distribution counts the number of successes that occur in a fixed number of independent trials that have mutually exclusive (i.e. yes or no) outcomes.
- ✗ **C)** A continuous uniform distribution has a lower limit but no upper limit.

Explanation

Binomial probability distributions give the result of a single outcome and are used to study discrete random variables where you want to know the probability that an exact event will happen. A continuous uniform distribution has both an upper and a lower limit. A discrete uniform random variable has equal probabilities for each outcome.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #48 of 193

Question ID: 413253

According to the Central Limit Theorem, the distribution of the sample means is approximately *normal* if:

✗ **A)** the underlying population is normal.

✗ **B)** the standard deviation of the population is known.

✓ **C)** the sample size n > 30.

Explanation

The Central Limit Theorem states that if the sample size is sufficiently large (i.e. greater than 30) the sampling distribution of the sample means will be approximately normal.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #49 of 193

Question ID: 413140

Which of the following is *least likely* a probability distribution?

✓ **A)** Zeta Corp.: P(dividend increases) = 0.60, P(dividend decreases) = 0.30.

✗ **B)** Roll an irregular die: p(1) = p(2) = p(3) = p(4) = 0.2 and p(5) = p(6) = 0.1.

✗ **C)** Flip a coin: P(H) = P(T) = 0.5.

Explanation

All the probabilities must be listed. In the case of Zeta Corp. the probabilities do not sum to one.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #50 of 193

Question ID: 413322

When sampling from a population, the *most* appropriate sample size:

✓ **A)** involves a trade-off between the cost of increasing the sample size and the value of increasing the precision of the estimates.

✗ **B)** minimizes the sampling error and the standard deviation of the sample statistic around its population value.

✗ **C)** is at least 30.

Explanation

A larger sample reduces the sampling error and the standard deviation of the sample statistic around its population value. However, this does not imply that the sample should be as large as possible, or that the sampling error must be as small as can be achieved. Larger samples might contain observations that come from a different population, in which case they would not necessarily improve the estimates of the population parameters. Cost also increases with the sample size. When the cost of increasing the sample size is greater than the value of the extra precision gained, increasing the sample size is not appropriate.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #51 of 193

Question ID: 434214

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690

Books Fast, Inc., prides itself on shipping customer orders quickly. Books Fast sampled 27 of its customers within a 200-mile radius and found a mean delivery time of 76 hours, with a sample standard deviation of 6 hours. Based on this sample and assuming a normal distribution of delivery times, what is the confidence interval for the mean delivery time at 5% significance?

✗ **A)** 65.75 to 86.25 hours.

✓ **B)** 73.63 to 78.37 hours.

✗ **C)** 68.50 to 83.50 hours.

Explanation

The confidence interval is equal to 76 + or − $(2.056)(6 / \sqrt{27})$ = 73.63 to 78.37 hours.
Because the sample size is small, we use the t-distribution with (27 − 1) degrees of freedom.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #52 of 193

Question ID: 413229

A stock increased in value last year. Which will be greater, its continuously compounded or its holding period return?

- ✗ **A)** Neither, they will be equal.
- ✓ **B)** Its holding period return.
- ✗ **C)** Its continuously compounded return.

Explanation

When a stock increases in value, the holding period return is always greater than the continuously compounded return that would be required to generate that holding period return. For example, if a stock increases from $1 to $1.10 in a year, the holding period return is 10%. The continuously compounded rate needed to increase a stock's value by 10% is Ln(1.10) = 9.53%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #53 of 193

Question ID: 413199

A grant writer for a local school district is trying to justify an application for funding an after-school program for low-income families. Census information for the school district shows an average household income of $26,200 with a standard deviation of $8,960. Assuming that the household income is normally distributed, what is the percentage of households in the school district with incomes of less than $12,000?

- ✗ **A)** 15.87%.
- ✓ **B)** 5.71%.
- ✗ **C)** 9.92%.

Explanation

Z = ($12,000 - $26,200) / $8,960 = -1.58.

From the table of areas under the standard normal curve, 5.71% of observations are more than 1.58 standard deviations below the mean.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #54 of 193

Question ID: 413311

Sunil Hameed is a reporter with the weekly periodical The *Fun Finance Times*. Today, he is scheduled to interview a researcher who claims to have developed a successful technical trading strategy based on trading on the CEO's birthday (sample was taken from the Fortune 500). After the interview, Hameed summarizes his notes (partial transcript as follows). The researcher:

- was defensive about the lack of economic theory consistent with his results.
- used the same database of data for all his tests and has not tested the trading rule on out-of-sample data.
- excluded stocks for which he could not determine the CEO's birthday.
- used a sample cut-off date of the month before the latest market correction.

Select the choice that *best* completes the following: Hameed concludes that the research is flawed because the data and process are biased by:

- ✗ **A)** data mining, time-period bias, and look-ahead bias.
- ✓ **B)** data mining, sample selection bias, and time-period bias.
- ✗ **C)** sample selection bias and time-period bias.

Explanation

Evidence that the researcher used *data mining* is that he was defensive about the lack of economic theory consistent with his results and that he used the same database of data for all his tests. One way to *avoid* data mining is to test the trading rule on out-of-sample data. *Sample selection bias* occurs when some data is systematically excluded from the analysis, usually because it is not available. Here, the researcher excluded stocks for which he could not determine the CEO's birthday. *Time-period bias* can result if the time period is too short or too long. Here, it is likely that the period was too short since the researcher used a cut-off date of the month before the latest market correction. *Note:* this could be an additional example of data mining.

We are not given enough information to determine if the researcher is guilty of look-ahead bias (which occurs when the analyst uses historical data that was not publicly available at the time being studied).

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #55 of 193

Question ID: 434209

A stated interest rate of 9% compounded continuously results in an effective annual rate *closest to*:

- ✗ **A)** 9.67%.
- ✓ **B)** 9.42%.

✗ **C)** 9.20%.

Explanation

The effective annual rate with continuous compounding = $e^r - 1 = e^{0.09} - 1 = 0.09417$, or 9.42%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #56 of 193

Question ID: 413139

Which of the following statements about probability distributions is *least* accurate?

✗ **A)** The skewness of a normal distribution is zero.

✗ **B)** A discrete random variable is a variable that can assume only certain clearly separated values resulting from a count of some set of items.

✓ **C)** A binomial probability distribution is an example of a continuous probability distribution.

Explanation

The binomial probability distribution is an example of a *discrete* probability distribution. There are only two possible outcomes of each trial and the outcomes are mutually exclusive. For example, in a coin toss the outcome is either heads or tails.

The other responses are both correct definitions.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #57 of 193

Question ID: 413263

Melissa Cyprus, CFA, is conducting an analysis of inventory management practices in the retail industry. She assumes the population cross-sectional standard deviation of inventory turnover ratios is 20. How large a random sample should she gather in order to ensure a standard error of the sample mean of 4?

✓ **A)** 25.

✗ **B)** 20.

✗ **C)** 80.

Explanation

Given the population standard deviation and the standard error of the sample mean, you can solve for the sample size. Because the standard error of the sample mean equals the standard deviation of the population divided by the square root of the sample size, $4 = 20 / n^{1/2}$, so $n^{1/2} = 5$, so $n = 25$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #58 of 193

Question ID: 434207

Claude Bellow, CFA, is an analyst with a real-estate focused investment firm. Today, one of the partners e-mails Bellow the following table and requests that he look into the reward-to-variability ratios of two asset classes. The table below gives five years of annual returns for Marley REIT (real estate investment trust) and a large urban apartment building. Marley REIT invests in commercial properties. The risk-free rate is 5.0% and the firm's threshold rate for this type is investment is 5.7%. (*Note:* For this question, calculate the mean returns using the *arithmetic mean*.)

Table 1: Annual returns (in %)					
Asset	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Marley REIT	15.0	8.0	13.0	9.0	13.0
Apartment Bldg	10.0	-1.0	8.0	8.0	9.0

One of the office assistants begins to "run some numbers," but is then called away to an important meeting. So far, the assistant has calculated the standard deviation of the apartment building returns at 3.97% and the standard deviation of the REIT returns at 2.65%. (He assumed that the returns given represent the entire population of returns.) Now, Bellow must finish the work.

Bellow should conclude that the:

✓ **A)** REIT has a higher excess return per unit of risk than the apartment building has per unit of risk.

✗ **B)** partner is asking Bellow to select the investment with the minimal probability that the return falls below 5.70%.

✗ **C)** safety-first ratio for the REIT is 2.49.

Explanation

Another name for the reward-to-variability ratio is the Sharpe ratio, and the Sharpe ratio measures the excess return per unit of risk. So, the question is asking us to identify which investment has the highest Sharpe ratio. The formula is:

$$\text{Sharpe Ratio} = \frac{\overline{r_p} - \overline{r_f}}{\sigma_p}$$

where: $\overline{r_p}$ = portfolio return; $\overline{r_f}$ = risk free return; σ = standard deviation

The Sharpe Ratio measures the excess return per unit of risk.

For the apartment building:

- The standard deviation of apartment building returns is 3.97%.
- The mean expected return of the apartment building = (10 − 1 + 8 + 8 + 9) / 5 = 6.8%
- Thus, the **Sharpe Ratio$_{\text{Apt}}$** = (6.80% - 5.00%) / 3.97% = **0.45.**

For the REIT:

- The standard deviation of the REIT returns is 2.65%.
- The mean expected return of the REIT = (15 + 8 + 13 + 9 + 13) / 5 = 11.6%
- Thus, the **Sharpe Ratio$_{\text{REIT}}$** = (11.60% − 5.00%) / 2.65% = **2.49.**

Thus, the REIT has a higher Sharpe ratio and thus a higher excess return per unit of risk than the apartment building has per unit of risk. Investors prefer a large Sharpe ratio because it is assumed that they prefer return to risk.

The other statements are false. Remember that the partner asked about the reward-to-variability ratio. The safety-first ratio is very similar to the Sharpe ratio, except that the safety-first ratio replaces the risk-free rate term with the threshold rate. Thus, the safety-first ratio for the REIT = [(11.6% − 5.7%) / 2.65%] = 2.23. If the partner had asked about the safety-first ratio, he would have been asking Bellow to select the investment with the minimal probability that the return falls below 5.70%. As shown in the calculation of the REIT Sharpe Ratio, the REIT's excess return over the risk free rate = 11.6% − 5.0% = 6.60%.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #59 of 193

Question ID: 413195

The average amount of snow that falls during January in Frostbite Falls is normally distributed with a mean of 35 inches and a standard deviation of 5 inches. The probability that the snowfall amount in January of next year will be between 40 inches and 26.75 inches is *closest* to:

✗ **A)** 87%.

✓ **B)** 79%.

✗ **C)** 68%.

Explanation

To calculate this answer, we will use the properties of the standard normal distribution. First, we will calculate the Z-value for the upper and lower points and then we will determine the approximate probability covering that range. *Note:* This question is an example of why it is important to memorize the general properties of the normal distribution.

Z = (observation - population mean) / standard deviation

- $Z_{26.75}$ = (26.75 - 35) / 5 = -1.65. (1.65 standard deviations to the left of the mean)
- Z_{40} = (40 - 35) / 5 = 1.0 (1 standard deviation to the right of the mean)

Using the general approximations of the normal distribution:

- 68% of the observations fall within ± one standard deviation of the mean. So, 34% of the area falls between 0 and +1 standard deviation from the mean.
- 90% of the observations fall within ± 1.65 standard deviations of the mean. So, 45% of the area falls between 0 and +1.65 standard deviations from the mean.

Here, we have 34% to the right of the mean and 45% to the left of the mean, for a total of **79%.**

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #60 of 193

Question ID: 413191

For a normal distribution, what *approximate* percentage of the observations fall within ±3 standard deviation of the mean?

✗ **A)** 66%.

✗ **B)** 95%.

✓ **C)** 99%.

Explanation

For normal distributions, approximately 99% of the observations fall within ±3 standard deviations of the mean.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #61 of 193

Question ID: 413181

A multivariate normal distribution that includes three random variables can be completely described by the means and variances of each of the random variables and the:

- ✗ **A)** conditional probabilities among the three random variables.
- ✗ **B)** correlation coefficient of the three random variables.
- ✓ **C)** correlations between each pair of random variables.

Explanation

A multivariate normal distribution that includes three random variables can be completely described by the means and variances of each of the random variables and the correlations between each pair of random variables. Correlation measures the strength of the linear relationship between two random variables (thus, "the correlation coefficient of the three random variables" is inaccurate).

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #62 of 193

Question ID: 413168

Tracking error for a portfolio is *best* described as the:

- ✗ **A)** standard deviation of differences between an index return and portfolio return.
- ✓ **B)** portfolio return minus a benchmark return.
- ✗ **C)** sample mean minus population mean.

Explanation

Tracking error is the difference between the total return on a portfolio and the total return on the benchmark used to measure the portfolio's performance. The difference between a sample statistic and a population parameter is sampling error. The standard deviation of the difference between a portfolio return and an index (or any chosen benchmark return) is more often referred to as tracking *risk*.

References

Question From: Session 3 > Reading 10 > LOS h

Related Material:

- Key Concepts by LOS

Question #63 of 193

Question ID: 413268

A traffic engineer is trying to measure the effects of carpool-only lanes on the expressway. Based on a sample of 100 cars at rush hour, he finds that the mean number of occupants per car is 2.5, and the sample standard deviation is 0.4. What is the standard error of the sample mean?

✗ **A)** 1.00.

✓ **B)** 0.04.

✗ **C)** 5.68.

Explanation

The standard error of the sample mean when the standard deviation of the population is not known is estimated by the standard deviation of the sample divided by the square root of the sample size. In this case, $0.4 / \sqrt{100} = 0.04$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #64 of 193

Question ID: 413267

If the number of offspring for females of a certain mammalian species has a mean of 16.4 and a standard deviation of 3.2, what will be the standard error of the sample mean for a survey of 25 females of the species?

✗ **A)** 1.28.

✗ **B)** 3.20.

✓ **C)** 0.64.

Explanation

The standard error of the sample mean when the standard deviation of the population is known is equal to the standard deviation of the population divided by the square root of the sample size. In this case, $3.2 / \sqrt{25} = 0.64$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #65 of 193

Question ID: 413156

For a certain class of junk bonds, the probability of default in a given year is 0.2. Whether one bond defaults is independent of whether another bond defaults. For a portfolio of five of these junk bonds, what is the probability that zero or one bond of the five defaults in the year ahead?

✗ **A)** 0.4096.

✓ **B)** 0.7373.

✗ **C)** 0.0819.

Explanation

The outcome follows a binomial distribution where n = 5 and p = 0.2. In this case $p(0) = 0.8^5 = 0.3277$ and $p(1) = 5 \times 0.8^4 \times 0.2 = 0.4096$, so P(X=0 or X=1) = 0.3277 + 0.4096.

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #66 of 193

Question ID: 413231

Monte Carlo simulation is necessary to:

✗ **A)** compute continuously compounded returns.

✗ **B)** reduce sampling error.

✓ **C)** approximate solutions to complex problems.

Explanation

This is the purpose of this type of simulation. The point is to construct distributions using complex combinations of hypothesized parameters.

References

Question From: Session 3 > Reading 10 > LOS q

Related Material:

- Key Concepts by LOS

Question #67 of 193

Question ID: 413135

The number of ships in the harbor is an example of what kind of variable?

✗ **A)** Continuous.

✓ **B)** Discrete.

✗ **C)** Indiscrete.

Explanation

A discrete variable is one that is represented by finite units.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #68 of 193

Question ID: 484167

The sample mean return of Bartlett Co. is 3% and the standard deviation is 6% based on 30 monthly returns. What is the confidence interval of a two tailed z-test of the population mean with a 5% level of significance?

- ✗ **A)** 1.90 to 4.10.
- ✗ **B)** 2.61 to 3.39.
- ✓ **C)** 0.85 to 5.15.

Explanation

The standard error of the sample is the standard deviation divided by the square root of n, the sample size. 6% / $30^{1/2}$ = 1.0954%.

The confidence interval = point estimate +/- (reliability factor × standard error)

confidence interval = 3 +/- (1.96 × 1.0954) = 0.85 to 5.15

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #69 of 193

Question ID: 413216

If random variable *Y* follows a lognormal distribution then the natural log of *Y* must be:

- ✓ **A)** normally distributed.
- ✗ **B)** lognormally distributed.
- ✗ **C)** denoted as e^x.

Explanation

For any random variable that is lognormally distributed its natural logarithm (ln) will be normally distributed.

References

Question From: Session 3 > Reading 10 > LOS o

Related Material:

- Key Concepts by LOS

Question #70 of 193

Question ID: 413282

Which one of the following statements about the t-distribution is *most* accurate?

✓ **A)** The t-distribution approaches the standard normal distribution as the number of degrees of freedom becomes large.

✗ **B)** Compared to the normal distribution, the t-distribution has less probability in the tails.

✗ **C)** The t-distribution is the only appropriate distribution to use when constructing confidence intervals based on large samples.

Explanation

As the number of degrees of freedom grows, the t-distribution approaches the shape of the standard normal distribution. Compared to the normal distribution, the t-distribution has fatter tails. When choosing a distribution, three factors must be considered: sample size, whether population variance is known, and if the distribution is normal.

References

Question From: Session 3 > Reading 11 > LOS i

Related Material:

- Key Concepts by LOS

Question #71 of 193

Question ID: 413225

If a stock decreases from $90 to $80, the continuously compounded rate of return for the period is:

✗ **A)** -0.1250.

✓ **B)** -0.1178.

✗ **C)** -0.1000.

Explanation

This is given by the natural logarithm of the new price divided by the old price; ln(80 / 90) = -0.1178.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #72 of 193

Question ID: 434208

A stock that pays no dividend is currently priced at 42.00. One year ago the stock was 44.23. The continuously compounded rate of return is *closest to*:

✓ **A)** −5.17%.

✗ **B)** +5.17%.

✗ **C)** −5.04%.

Explanation

$$\ln\left(\frac{S_1}{S_0}\right) = \ln\left(\frac{42.00}{44.23}\right) = \ln(0.9496) = -0.0517 = -5.17\%$$

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #73 of 193

Question ID: 413165

A stock priced at $10 has a 60% probability of moving up and a 40% probability of moving down. If it moves up, it increases by a factor of 1.06. If it moves down, it decreases by a factor of 1/1.06. What is the expected stock price after two successive periods?

✗ **A)** $11.24.

✓ **B)** $10.27.

✗ **C)** $10.03.

Explanation

If the stock moves up twice, it will be worth $10 × 1.06 × 1.06 = $11.24. The probability of this occurring is 0.60 × 0.60 = 0.36. If the stock moves down twice, it will be worth $10 × (1/1.06) × (1/1.06) = $8.90. The probability of this occurring is 0.40 × 0.40 = 0.16. If the stock moves up once and down once, it will be worth $10 × 1.06 × (1/1.06) = $10.00. This can occur if either the stock goes up then down or down then up. The probability of this occurring is 0.60 × 0.40 + 0.40 × 0.60 = 0.48. Multiplying the potential stock prices by the probability of them occurring provides the expected stock price: ($11.24 × 0.36) + ($8.90 × 0.16) + ($10.00 × 0.48) = $10.27.

References

Question From: Session 3 > Reading 10 > LOS g

Related Material:

- Key Concepts by LOS

Question #74 of 193

Question ID: 413313

An analyst has compiled stock returns for the first 10 days of the year for a sample of firms and estimated the correlation between these returns and changes in book value for these firms over the just ended year. What objection could be raised to such a correlation being used as a trading strategy?

- ✓ **A)** The study suffers from look-ahead bias.
- ✗ **B)** Use of year-end values causes a time-period bias.
- ✗ **C)** Use of year-end values causes a sample selection bias.

Explanation

The study suffers from look-ahead bias because traders at the beginning of the year would not be able to know the book value changes. Financial statements usually take 60 to 90 days to be completed and released.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #75 of 193

Question ID: 413134

Which of the following is a discrete random variable?

- ✗ **A)** The realized return on a corporate bond.
- ✗ **B)** The amount of time between two successive stock trades.
- ✓ **C)** The number of advancing stocks in the DJIA in a day.

Explanation

Since the DJIA consists of only 30 stocks, the answer associated with it would be a discrete random variable. Random variables measuring time, rates of return and weight will be continuous.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #76 of 193

Question ID: 413187

A portfolio manager is looking at an investment that has an expected annual return of 10% with a standard deviation of annual returns of 5%. Assuming the returns are approximately normally distributed, the probability that the return will exceed 20% in any given year is *closest* to:

- ✗ **A)** 0.0%.
- ✓ **B)** 2.28%.
- ✗ **C)** 4.56%.

Explanation

Given that the standard deviation is 5%, a 20% return is two standard deviations above the expected return of 10%. Assuming a normal distribution, the probability of getting a result more than two standard deviations above the expected return is 1 − Prob(Z ≤ 2) = 1 − 0.9772 = 0.0228 or 2.28% (from the Z table).

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #77 of 193

Question ID: 413309

Which of the following is the *best* method to avoid data mining bias when testing a profitable trading strategy?

- ✓ **A)** Test the strategy on a different data set than the one used to develop the rules.
- ✗ **B)** Increase the sample size to at least 30 observations per year.
- ✗ **C)** Use a sample free of survivorship bias.

Explanation

The *best* way to avoid data mining is to test a potentially profitable trading rule on a data set different than the one you used to develop the rule (out-of-sample data). A larger sample size won't prevent data mining, and you can still data mine a database free of survivorship bias.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #78 of 193

Question ID: 413221

Compared to a discretely compounded rate of return, continuous compounding will *most likely* result in a rate of return that is:

- ✗ **A)** lower.
- ✗ **B)** the same.
- ✓ **C)** higher.

Explanation

A higher frequency of compounding leads to a higher compounded rate of return. A continuously compounded rate is therefore higher than any discretely compounded (and positive) rate of return.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #79 of 193

Question ID: 413276

Which of the following statements about sampling and estimation is *most* accurate?

- ✗ **A)** The standard error of the sample means when the standard deviation of the population is known equals $\sigma / \sqrt{n}$, where σ = sample standard deviation adjusted by $n - 1$.
- ✓ **B)** The standard error of the sample means when the standard deviation of the population is unknown equals $s / \sqrt{n}$, where s = sample standard deviation.
- ✗ **C)** The probability that a parameter lies within a range of estimated values is given by α.

Explanation

The probability that a parameter lies within a range of estimated values is given by $1 - \alpha$. The standard error of the sample means when the standard deviation of the population is known equals $\sigma / \sqrt{n}$, where σ = *population* standard deviation.

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #80 of 193

Question ID: 413223

The continuously compounded rate of return that will generate a one-year holding period return of -6.5% is *closest* to:

- ✗ **A)** -5.7%.
- ✓ **B)** -6.7%.

✗ **C)** -6.3%.

Explanation

Continuously compounded rate of return = ln(1 − 0.065) = -6.72%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #81 of 193

Question ID: 710143

A stock price decreases in one period and then increases by an equal amount in the next period. The investor calculates a holding period return for each period and calculates their arithmetic mean. The investor also calculates the continuously compounded rate of return for each period and calculates the arithmetic mean of these. Which of the arithmetic means will be greater?

✓ **A)** The mean of the holding period returns.

✗ **B)** The mean of the continuously compounded returns.

✗ **C)** Neither, because both will equal zero.

Explanation

The holding period returns will have a positive arithmetic mean. For example, a fall from 100 to 90 is a decrease of 10%, but a rise from 90 to 100 is an increase of 11.1%.

The continuously compounded returns will have an arithmetic mean of zero. Using the same example values, ln(90/100) = -10.54% and ln(100/90) = 10.54%.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #82 of 193

Question ID: 413182

In a multivariate normal distribution, a correlation tells the:

✗ **A)** overall relationship between all the variables.

✓ **B)** strength of the linear relationship between two of the variables.

✗ **C)** relationship between the means and variances of the variables.

Explanation

This is true by definition. The correlation only applies to two variables at a time.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #83 of 193

Question ID: 413205

The annual rainfall amount in Yucutat, Alaska, is normally distributed with a mean of 150 inches and a standard deviation of 20 inches. The 90% confidence interval for the annual rainfall in Yucutat is *closest* to:

- ✗ **A)** 137 to 163 inches.
- ✗ **B)** 110 to 190 inches.
- ✓ **C)** 117 to 183 inches.

Explanation

The 90% confidence interval is $\mu \pm 1.65$ standard deviations. $150 - 1.65(20) = 117$ and $150 + 1.65(20) = 183$.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #84 of 193

Question ID: 413152

A cumulative distribution function for a random variable *X* is given as follows:

x	*F(x)*
5	0.14
10	0.25
15	0.86
20	1.00

The probability of an outcome less than or equal to 10 is:

- ✗ **A)** 14%.
- ✓ **B)** 25%.

✗ **C)** 39%.

Explanation

A cumulative distribution function (cdf) gives the probability of an outcome for a random variable less than or equal to a specific value. For the random variable *X*, the cdf for the outcome 10 is 0.25, which means there is a 25% probability that *X* will take a value less than or equal to 10.

References

Question From: Session 3 > Reading 10 > LOS d

Related Material:

- Key Concepts by LOS

Question #85 of 193

Question ID: 413236

From the entire population of McDonald's franchises, an analyst constructs a sample of the monthly sales volume for 20 randomly selected franchises. She calculates the mean sales volume for those 20 franchises to be $400,000. The sampling distribution of the mean is the probability distribution of the:

✓ **A)** mean monthly sales volume estimates from all possible samples of 20 observations.

✗ **B)** mean monthly sales volume estimates from all possible samples.

✗ **C)** monthly sales volume for all McDonald's franchises.

Explanation

The sampling distribution of a sample statistic is a probability distribution made up of all possible *sample statistics* computed from samples *of the same size* randomly drawn from the same population, along with their associated probabilities.

References

Question From: Session 3 > Reading 11 > LOS a

Related Material:

- Key Concepts by LOS

Question #86 of 193

Question ID: 413170

A random variable follows a continuous uniform distribution over 27 to 89. What is the probability of an outcome between 34 and 38?

✗ **A)** 0.0546.

✓ **B)** 0.0645.

✗ **C)** 0.0719.

Explanation

$P(34 \leq X \leq 38) = (38 - 34) / (89 - 27) = 0.0645$

References

Question From: Session 3 > Reading 10 > LOS i

Related Material:

- Key Concepts by LOS

Question #87 of 193

Question ID: 413162

The Night Raiders, an expansion team in the National Indoor Football League, is having a challenging first season with a current win loss record of 0 and 4. However, the team recently signed four new defensive players and one of the team sponsors (who also happens to hold a CFA charter) calculates the probability of the team winning a game at 0.40. Assuming that whether the team wins a game is independent of whether it wins any other game, the probability that the team will win 6 out of the next 10 games is *closest* to:

- ✗ **A)** 0.350.
- ✓ **B)** 0.112.
- ✗ **C)** 0.417.

Explanation

Use the formula for a binomial random variable to calculate the answer to this question. We will define "success" as the team winning a game. The formula is:

> $p(x) = P(X = x) = [\text{number of ways to choose x from n}] \times p^x \times (1 - p)^{n-x}$,

where [number of ways to choose x from n] = n! / [(n - x)! × x!].

Here, $p(x) = P(X = 6) = [10! / (10 - 6)! \times 6!] \times 0.40^6 \times (1 - 0.40)^{10-6}$
= 210.0 × 0.00410 × 0.12960 = 0.11159, or approximately 0.112.

To calculate factorial using your financial calculator: On the TI, factorial is [2nd] ¡→ [*x!*]. On the HP, factorial is [g] → [n!]. To compute 10! on the TI, enter [10] → [2nd] → [*x!*] = 3,628,800. On the HP, use [10] → [ENTER] → [g] → [n!].

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #88 of 193

Question ID: 413155

Possible outcomes for a discrete uniform distribution are the integers 2 to 9 inclusive. What is the probability of an outcome less than 5?

- ✗ **A)** 62.5%.
- ✗ **B)** 50.0%.
- ✓ **C)** 37.5%.

Explanation

This distribution has eight discrete outcomes, each with an equal probability of 1/8 or 12.5%. Because three of the eight outcomes are less than 5, the probability of an outcome less than 5 is 3/8 or 37.5%.

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #89 of 193

Question ID: 413269

From a population of 5,000 observations, a sample of n = 100 is selected. Calculate the standard error of the sample mean if the population standard deviation is 50.

- ✗ **A)** 50.00.
- ✓ **B)** 5.00.
- ✗ **C)** 4.48.

Explanation

The standard error of the sample mean equals the standard deviation of the population divided by the square root of the sample size: 50 / $100^{1/2}$ = 5.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #90 of 193

Question ID: 413153

The number of days a particular stock increases in a given five-day period is uniformly distributed between zero and five inclusive. In a given five-day trading week, what is the probability that the stock will increase exactly three days?

- ✓ **A)** 0.167.
- ✗ **B)** 0.600.

✗ **C)** 0.333.

Explanation

If the possible outcomes are X:(0,1,2,3,4,5), then the probability of each of the six outcomes is 1 / 6 = 0.167.

References

Question From: Session 3 > Reading 10 > LOS e

Related Material:

- Key Concepts by LOS

Question #91 of 193

Question ID: 529150

Standard Normal Distribution

$P(Z \leq z) = N(z)$ for $z \geq 0$

z	**0.0**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389

John Cupp, CFA, has several hundred clients. The values of the portfolios Cupp manages are approximately normally distributed with a mean of $800,000 and a standard deviation of $250,000. The probability of a randomly selected portfolio being in excess of $1,000,000 is:

✓ **A)** 0.2119.

✗ **B)** 0.3773.

✗ **C)** 0.1057.

Explanation

Although the number of clients is discrete, since there are several hundred of them, we can treat them as continuous. The selected random value is standardized (its z-value is calculated) by subtracting the mean from the selected value and dividing by the standard deviation. This results in a z-value of (1,000,000 - 800,000) / 250,000 = 0.8. Looking up 0.8 in the z-value table yields 0.7881 as the probability that a random variable is to the left of the standardized value (i.e., less than $1,000,000). Accordingly, the probability of a random variable being to the right of the standardized value (i.e., greater than $1,000,000) is 1 - 0.7881 = 0.2119.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #92 of 193

Question ID: 434218

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373

From a sample of 41 orders for an on-line bookseller, the average order size is $75, and the sample standard deviation is $18. Assume the distribution of orders is normal. For which interval can one be exactly 90% confident that the population mean is contained in that interval?

- ✗ **A)** $74.24 to $75.76.
- ✓ **B)** $70.27 to $79.73.
- ✗ **C)** $71.29 to 78.71.

Explanation

If the distribution of the population is *normal*, but we *don't know* the population variance, we can use the Student's t-distribution to construct a confidence interval. Because there are 41 observations, the degrees of freedom are 40. From Student's *t* table, we can determine that the reliability factor for $t_{\alpha/2}$, or $t_{0.05}$, is 1.684. Then the 90% confidence interval is $75.00 ± 1.684($18.00 / √41), or $75.00 ± 1.684 × $2.81 or $75.00 ± $4.73

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #93 of 193

Question ID: 413151

Which of the following qualifies as a cumulative distribution function?

- ✓ **A)** F(1) = 0, F(2) = 0.25, F(3) = 0.50, F(4) = 1.
- ✗ **B)** F(1) = 0.5, F(2) = 0.25, F(3) = 0.25.
- ✗ **C)** F(1) = 0, F(2) = 0.5, F(3) = 0.5, F(4) = 0.

Explanation

Because a cumulative probability function defines the probability that a random variable takes a value equal to or less than a given number, for successively larger numbers, the cumulative probability values must stay the same or increase.

References

Question From: Session 3 > Reading 10 > LOS d

Related Material:

- Key Concepts by LOS

Question #94 of 193

Question ID: 413149

The cumulative distribution function for a random variable X is given in the following table:

x	*F(x)*
5	*0.15*
10	*0.30*
15	*0.45*
20	*0.75*
25	*1.00*

The probability of an outcome greater than 15 is:

- ✗ **A)** 75%.
- ✓ **B)** 55%.
- ✗ **C)** 45%.

Explanation

A cumulative distribution function (cdf) gives the probability of an outcome for a random variable less than or equal to a specific value. For the random variable X, the cdf for the outcome 15 is 0.45, which means there is a 45% probability that X will take a value less than or equal to 15. Therefore, the probability of a value greater than 15 equals 100% - 45% = 55%.

References

Question From: Session 3 > Reading 10 > LOS d

Related Material:

- Key Concepts by LOS

Question #95 of 193

Question ID: 413194

A group of investors wants to be sure to always earn at least a 5% rate of return on their investments. They are looking at an investment that has a normally distributed probability distribution with an expected rate of return of 10% and a standard deviation of 5%. The probability of meeting or exceeding the investors' desired return in any given year is *closest to:*

- ✗ **A)** 98%.
- ✓ **B)** 84%.
- ✗ **C)** 34%.

Explanation

The mean is 10% and the standard deviation is 5%. You want to know the probability of a return 5% or better. 10% - 5% = 5% , so 5% is one standard deviation less than the mean. Thirty-four percent of the observations are between the mean and one standard deviation on the down side. Fifty percent of the observations are greater than the mean. So the probability of a return 5% or higher is 34% + 50% = 84%.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #96 of 193

Question ID: 452011

Standard Normal Distribution

P(Z ≤ z) = N(z) for z ≥ 0

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319

Given a normally distributed population with a mean income of $40,000 and standard deviation of $7,500, what percentage of the population makes between $30,000 and $35,000?

- ✓ **A)** 15.96.
- ✗ **B)** 41.67.

✗ **C)** 13.34.

Explanation

The *z*-score for $30,000 = ($30,000 - $40,000) / $7,500 or -1.3333, which corresponds with 0.0918. The *z*-score for $35,000 = ($35,000 - $40,000) / $7,500 or -0.6667, which corresponds with 0.2514. The difference is 0.1596 or 15.96%.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #97 of 193

Question ID: 413256

Suppose the mean debt/equity ratio of the population of all banks in the United States is 20 and the population variance is 25. A banking industry analyst uses a computer program to select a random sample of 50 banks from this population and compute the sample mean. The program repeats this exercise 1000 times and computes the sample mean each time. According to the central limit theorem, the sampling distribution of the 1000 sample means will be approximately normal if the population of bank debt/equity ratios has:

✗ **A)** a normal distribution, because the sample is random.

✗ **B)** a Student's *t*-distribution, because the sample size is greater than 30.

✓ **C)** any probability distribution.

Explanation

The central limit theorem tells us that for a population with a mean μ and a finite variance σ^2, the sampling distribution of the sample means of all possible samples of size *n* will be approximately normally distributed with a mean equal to μ and a variance equal to σ^2/n, *no matter the distribution of the population*, assuming a large sample size.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #98 of 193

Question ID: 710145

Which of the following statements regarding confidence intervals is *most* accurate?

✓ **A)** The lower the significance level, the wider the confidence interval.

✗ **B)** The lower the degree of confidence, the wider the confidence interval.

✗ **C)** The higher the significance level, the wider the confidence interval.

Explanation

A higher degree of confidence requires a wider confidence interval. The degree of confidence is equal to one minus the significance level, and so the wider the confidence interval, the higher the degree of confidence and the lower the significance level.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #99 of 193

Question ID: 413161

There is an 80% chance of rain on each of the next six days. What is the probability that it will rain on exactly two of those days?

✗ **A)** 0.24327.

✓ **B)** 0.01536.

✗ **C)** 0.15364.

Explanation

$P(2) = 6! / [(6 - 2)! \times 2!] \times (0.8^2) \times (0.2^4) = 0.01536 = 6 \text{ nCr } 2 \times (0.8)^2 \times (0.2)^4$

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #100 of 193

Question ID: 413243

Sampling error can be defined as:

✗ **A)** the standard deviation of a sampling distribution of the sample means.

✗ **B)** rejecting the null hypothesis when it is true.

✓ **C)** the difference between a sample statistic and its corresponding population parameter.

Explanation

This is the definition.

References

Question From: Session 3 > Reading 11 > LOS b

Related Material:

- Key Concepts by LOS

Question #101 of 193

Question ID: 413169

If X follows a continuous uniform distribution over the interval $1 < X < 26$, the probability that X is between 5 and 15 is *closest* to:

- ✓ **A)** 40%.
- ✗ **B)** 60%.
- ✗ **C)** 10%.

Explanation

,p>Because this distribution is uniform, the probability of an outcome between 5 and 15 is the ratio of that interval to the entire interval from 1 to 26.
$(15 - 5) / (26 - 1) = 10 / 25 = 0.40$.

References

Question From: Session 3 > Reading 10 > LOS i

Related Material:

- Key Concepts by LOS

Question #102 of 193

Question ID: 413154

Which of the following random variables would be *most likely* to follow a discrete uniform distribution?

- ✗ **A)** The number of heads on the flip of two coins.
- ✓ **B)** The outcome of a roll of a standard, six-sided die where X equals the number facing up on the die.
- ✗ **C)** The outcome of the roll of two standard, six-sided dice where X is the sum of the numbers facing up.

Explanation

The discrete uniform distribution is characterized by an equal probability for each outcome. A single die roll is an often-used example of a uniform distribution. In combining two random variables, such as coin flip or die roll outcomes, the sum will not be uniformly distributed.

References

Question From: Session 3 > Reading 10 > LOS e

Related Material:

- Key Concepts by LOS

Question #103 of 193

Question ID: 413175

In a normal distribution, the:

- ✗ **A)** mean is greater than the median.
- ✓ **B)** median equals the mode.
- ✗ **C)** mean is less than the mode.

Explanation

In a normal distribution, the mean, median, and mode are all equal.

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #104 of 193

Question ID: 413217

If a random variable *x* is lognormally distributed then ln *x* is:

- ✓ **A)** normally distributed.
- ✗ **B)** abnormally distributed.
- ✗ **C)** defined as e^x.

Explanation

For any random variable that is normally distributed its natural logarithm (ln) will be lognormally distributed. The opposite is also true: for any random variable that is lognormally distributed its natural logarithm (ln) will be normally distributed.

References

Question From: Session 3 > Reading 10 > LOS o

Related Material:

- Key Concepts by LOS

Question #105 of 193

Question ID: 413174

A normal distribution can be completely described by its:

- ✗ **A)** mean and mode.
- ✓ **B)** mean and variance.
- ✗ **C)** skewness and kurtosis.

Explanation

The normal distribution can be completely described by its mean and variance.

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #106 of 193

Question ID: 413178

If X has a normal distribution with μ = 100 and σ = 5, then there is approximately a 90% probability that:

- ✗ **A)** P(90.2 < X < 109.8).
- ✓ **B)** P(91.8 < X < 108.3).
- ✗ **C)** P(93.4 < X < 106.7).

Explanation

100 +/- 1.65 (5) = 91.75 to 108.25 or P (P(91.75 < X < 108.25).

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #107 of 193

Question ID: 413215

Given *Y* is lognormally distributed, then ln *Y* is:

- ✗ **A)** a lognormal distribution.
- ✓ **B)** normally distributed.
- ✗ **C)** the antilog of *Y*.

Explanation

If *Y* is lognormally distributed, then ln *Y* is normally distributed.

References

Question From: Session 3 > Reading 10 > LOS o

Related Material:

- Key Concepts by LOS

Question #108 of 193

Question ID: 413306

The confidence interval for a parameter is calculated as:

- ✗ **A)** Point Estimate × Reliability Factor ± Standard Error.
- ✗ **B)** Point Estimate ± Standard Error.
- ✓ **C)** Point Estimate ± Reliability Factor × Standard Error.

Explanation

The confidence interval for a parameter is calculated as Point Estimate ± Reliability Factor × Standard Error. The reliability factor is based on the assumed distribution of the point estimate and the degree of confidence (1 − a) for the confidence interval.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #109 of 193

Question ID: 498734

Which of the following random variables assigns an equal probability to each possible outcome?

- ✗ **A)** Binomial random variable.
- ✓ **B)** Discrete uniform random variable.
- ✗ **C)** Bernoulli random variable.

Explanation

A discrete uniform random variable has a finite set of possible outcomes, each with an equal probability. A Bernoulli random variable has two possible outcomes (success or failure) that may or may not have equal probabilities. A binomial random variable is the number of successes in a given number of trials of a Bernoulli random variable.

References

Question From: Session 3 > Reading 10 > LOS e

Related Material:

- Key Concepts by LOS

Question #110 of 193

Question ID: 550538

The average return on small stocks over the period 1926-1997 was 17.7%, and the standard deviation of the sample was 33.9%. Assuming returns are normally distributed, the 95% confidence interval for the return on small stocks in any given year is:

- ✗ **A)** 16.8% to 18.6%.
- ✓ **B)** -48.7% to 84.1%.
- ✗ **C)** -16.2% to 51.6%.

Explanation

A 95% confidence interval is ± 1.96 standard deviations from the mean, so 0.177 ± 1.96(0.339) = (-48.7%, 84.1%).

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #111 of 193

Question ID: 413230

Which of the following statements describes a limitation of Monte Carlo simulation?

- ✗ **A)** Variables are assumed to be normally distributed but may actually have non-normal distributions.
- ✗ **B)** Simulations do not consider possible input values that lie outside historical experience.
- ✓ **C)** Outcomes of a simulation can only be as accurate as the inputs to the model.

Explanation

Monte Carlo simulations can be set up with inputs that have any distribution and any desired range of possible values. However, a limitation of the technique is that its output can only be as accurate as the assumptions an analyst makes about the range and distribution of the inputs.

References

Question From: Session 3 > Reading 10 > LOS q

Related Material:

- Key Concepts by LOS

Question #112 of 193

Question ID: 413237

A simple random sample is a sample constructed so that:

✓ **A)** each element of the population has the same probability of being selected as part of the sample.

✗ **B)** each element of the population is also an element of the sample.

✗ **C)** the sample size is random.

Explanation

Simple random sampling is a method of selecting a sample in such a way that each item or person in the population being studied has the same (non-zero) likelihood of being included in the sample.

References

Question From: Session 3 > Reading 11 > LOS a

Related Material:

- Key Concepts by LOS

Question #113 of 193

Question ID: 413258

Frank Grinder is trying to introduce sampling into the quality control program of an old-line manufacturer. Currently, each item is individually inspected to make sure it meets size tolerances. For all items manufactured during August, the standard deviation of size was 0.02 centimeters. If Grinder takes a sample of 30 items and finds a standard deviation of size of 0.019 centimeters, what is the standard error of the sample mean?

✗ **A)** 0.00600.

✗ **B)** 0.00200.

✓ **C)** 0.00365.

Explanation

If we know the standard deviation of the population (in this case we do), then the standard error of the sample mean = the standard deviation of the population / the square root of the sample size = $0.02 / \sqrt{30} = 0.00365$ centimeters.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #114 of 193

Question ID: 413286

A sample of 25 junior financial analysts gives a mean salary (in thousands) of 60. Assume the population variance is known to be 100. A 90% confidence interval for the mean starting salary of junior financial analysts is *most* accurately constructed as:

✗ **A)** $60 \pm 1.645(4)$.

✗ **B)** $60 \pm 1.645(10)$.

✓ **C)** 60 ± 1.645(2).

Explanation

Because we can compute the population standard deviation, we use the z-statistic. A 90% confidence level is constructed by taking the population mean and adding and subtracting the product of the z-statistic reliability ($z_{á/2}$) factor times the known standard deviation of the population divided by the square root of the sample size (note that the population variance is given and its positive square root is the standard deviation of the population): $x \pm z_{á/2} \times (\sigma / n^{1/2}) = 60 +/- 1.645 \times (100^{1/2} / 25^{1/2}) = 60 +/- 1.645 \times (10 / 5) = 60 +/- 1.645 \times 2$.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #115 of 193

Question ID: 413298

A sample of 100 individual investors has a mean portfolio value of $28,000 with a standard deviation of $4,250. The 95% confidence interval for the population mean is *closest* to:

✗ **A)** $27,575 to $28,425.

✗ **B)** $19,500 to $28,333.

✓ **C)** $27,159 to $28,842.

Explanation

Confidence interval = mean ± t_c{S / √n}

= 28,000 ± (1.98) (4,250 / √100) or 27,159 to 28,842

If you use a *z*-statistic because of the large sample size, you get 28,000 ± (1.96) (4,250 / √100) = 27,167 to 28,833, which is closest to the correct answer.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #116 of 193

Question ID: 413254

The central limit theorem states that, for any distribution, as *n* gets larger, the sampling distribution:

✓ **A)** approaches a normal distribution.

✗ **B)** approaches the mean.

✗ **C)** becomes larger.

Explanation

As *n* gets larger, the variance of the distribution of sample means is reduced, and the distribution of sample means approximates a normal distribution.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #117 of 193

Question ID: 413247

Thomas Merton, a car industry analyst, wants to investigate a relationship between the types of ads used in advertising campaigns and sales to customers in certain age groups. In order to make sure he includes manufacturers of all sizes, Merton divides the industry into four size groups and draws random samples from each group. What sampling method is Merton using?

✗ **A)** Simple random sampling.

✗ **B)** Cross-sectional sampling.

✓ **C)** Stratified random sampling.

Explanation

In stratified random sampling, we first divide the population into subgroups based on some relevant characteristic(s) and then make random draws from each group.

References

Question From: Session 3 > Reading 11 > LOS c

Related Material:

- Key Concepts by LOS

Question #118 of 193

Question ID: 434217

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
40	1.303	1.684	2.021	2.423	2.704	3.551

60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373

From a sample of 41 monthly observations of the S&P Mid-Cap index, the mean monthly return is 1% and the sample variance is 36. For which of the following intervals can one be *closest* to 95% confident that the population mean is contained in that interval?

- ✗ **A)** 1.0% ± 1.6%.
- ✓ **B)** 1.0% ± 1.9%.
- ✗ **C)** 1.0% ± 6.0%.

Explanation

If the distribution of the population is *nonnormal*, but we *don't know* the population variance, we can use the Student's t-distribution to construct a confidence interval. The sample standard deviation is the square root of the variance, or 6%. Because there are 41 observations, the degrees of freedom are 40. From the Student's *t* distribution, we can determine that the reliability factor for $t_{0.025}$, is 2.021. Then the 95% confidence interval is 1.0% ± 2.021(6 / √41) or 1.0% ± 1.9%.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #119 of 193

Question ID: 627885

Cumulative z-table:

z	0.00	0.01	0.02	0.03
1.6	0.9452	0.9463	0.9474	0.9484
1.7	0.9564	0.9564	0.9573	0.9582
1.8	0.9641	0.9649	0.9656	0.9664

Monthly sales of hot water heaters are approximately normally distributed with a mean of 21 and a standard deviation of 5. What is the probabilility of selling 12 hot water heaters or less next month?

- ✗ **A)** 96.41%.
- ✗ **B)** 1.80%.
- ✓ **C)** 3.59%.

Explanation

Z = (12 - 21) / 5 = -1.8

From the cumulative *z*-table, the probability of being more than 1.8 standard deviations below the mean, probability x < -1.8, is 3.59%.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #120 of 193

Question ID: 413189

An investment has a mean return of 15% and a standard deviation of returns equal to 10%. If returns are normally distributed, which of the following statements is *least* accurate? The probability of obtaining a return:

✗ **A)** greater than 35% is 0.025.

✗ **B)** between 5% and 25% is 0.68.

✓ **C)** greater than 25% is 0.32.

Explanation

Sixty-eight percent of all observations fall within +/- one standard deviation of the mean of a normal distribution. Given a mean of 15 and a standard deviation of 10, the probability of having an actual observation fall within one standard deviation, between 5 and 25, is 68%. The probability of an observation greater than 25 is half of the remaining 32%, or 16%. This is the same probability as an observation less than 5. Because 95% of all observations will fall within 20 of the mean, the probability of an actual observation being greater than 35 is half of the remaining 5%, or 2.5%.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #121 of 193

Question ID: 413136

A dealer in a casino has rolled a five on a single die three times in a row. What is the probability of her rolling another five on the next roll, assuming it is a fair die?

✗ **A)** 0.200.

✓ **B)** 0.167.

✗ **C)** 0.001.

Explanation

The probability of a value being rolled is 1/6 regardless of the previous value rolled.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #122 of 193

Question ID: 413249

The sample of per square foot sales for 100 U.S. retailers in December 2004 is an example of:

- ✗ **A)** unbiased data.
- ✓ **B)** cross-sectional data.
- ✗ **C)** time-series data.

Explanation

Cross-sectional data are a sample of observations taken at a single point in time. A time-series is a sample of observations taken at specific and equally spaced points in time.

References

Question From: Session 3 > Reading 11 > LOS d

Related Material:

- Key Concepts by LOS

Question #123 of 193

Question ID: 413192

A stock portfolio's returns are normally distributed. It has had a mean annual return of 25% with a standard deviation of 40%. The probability of a return between -41% and 91% is *closest to*:

- ✗ **A)** 95%.
- ✗ **B)** 65%.
- ✓ **C)** 90%.

Explanation

A 90% confidence level includes the range between plus and minus 1.65 standard deviations from the mean. $(91 - 25) / 40 = 1.65$ and $(-41 - 25) / 40 = -1.65$.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #124 of 193

Question ID: 413183

A multivariate distribution is *best* defined as describing the behavior of:

- ✗ **A)** a random variable with more than two possible outcomes.
- ✗ **B)** two or more independent random variables.
- ✓ **C)** two or more dependent random variables.

Explanation

A multivariate distribution describes the relationships between two or more random variables, when the behavior of each random variable is dependent on the others in some way.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #125 of 193

Question ID: 434215

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850

A traffic engineer is trying to measure the effects of carpool-only lanes on the expressway. Based on a sample of 20 cars at rush hour, he finds that the mean number of occupants per car is 2.5, with a standard deviation of 0.4. If the population is normally distributed, what is the confidence interval at the 5% significance level for the number of occupants per car?

- ✗ **A)** 2.387 to 2.613.
- ✓ **B)** 2.313 to 2.687.
- ✗ **C)** 2.410 to 2.589.

Explanation

The reliability factor corresponding with a 5% significance level (95% confidence level) for the Student's t-distribution with (20 − 1) degrees of freedom is 2.093. The confidence interval is equal to: $2.5 \pm 2.093(0.4 / \sqrt{20}) = 2.313$ to 2.687. (We must use the Student's t-distribution and reliability factors because of the small sample size.)

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #126 of 193

Question ID: 413180

Multivariate distributions can describe:

- ✗ **A)** continuous random variables only.
- ✗ **B)** discrete random variables only.
- ✓ **C)** either discrete or continuous random variables.

Explanation

Multivariate distributions can describe discrete or continuous random variables.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #127 of 193

Question ID: 413206

A food retailer has determined that the mean household income of her customers is $47,500 with a standard deviation of $12,500. She is trying to justify carrying a line of luxury food items that would appeal to households with incomes greater than $60,000. Based on her information and assuming that household incomes are normally distributed, what percentage of households in her customer base has incomes of $60,000 or more?

- ✗ **A)** 5.00%.
- ✗ **B)** 2.50%.
- ✓ **C)** 15.87%.

Explanation

Z = ($60,000 - $47,500) / $12,500 = 1.0

From the table of areas under the normal curve, 84.13% of observations lie to the left of +1 standard deviation of the mean. So, 100% - 84.13% = 15.87% with incomes of $60,000 or more.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #128 of 193

Question ID: 442251

Cumulative Z-Table

z	0.04	0.05
1.8	0.9671	0.9678
1.9	0.9738	0.9744
2.0	0.9793	0.9798
2.1	0.9838	0.9842

The owner of a bowling alley determined that the average weight for a bowling ball is 12 pounds with a standard deviation of 1.5 pounds. A ball denoted "heavy" should be one of the top 2% based on weight. Assuming the weights of bowling balls are normally distributed, at what weight (in pounds) should the "heavy" designation be used?

- ✗ **A)** 14.22 pounds.
- ✗ **B)** 14.00 pounds.
- ✓ **C)** 15.08 pounds.

Explanation

The first step is to determine the *z*-score that corresponds to the top 2%. Since we are only concerned with the top 2%, we only consider the right hand of the normal distribution. Looking on the cumulative table for 0.9800 (or close to it) we find a *z*-score of 2.05. To answer the question, we need to use the normal distribution given: 98 percentile = sample mean + (*z*-score)(standard deviation) = 12 + 2.05(1.5) = 15.08.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #129 of 193

Question ID: 413264

A sample of size n = 25 is selected from a normal population. This sample has a mean of 15 and a sample variance of 4. What is the standard error of the sample mean?

- ✗ **A)** 0.8.
- ✓ **B)** 0.4.
- ✗ **C)** 2.0.

Explanation

The standard error of the sample mean is estimated by dividing the standard deviation of the sample by the square root of the sample size. The standard deviation of the sample is calculated by taking the positive square root of the sample variance $4^{1/2} = 2$. Applying the formula: $s_x = s / n^{1/2} = 2 / (25)^{1/2} = 2 / 5 = 0.4$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #130 of 193

Question ID: 413141

Which of the following statements about the normal probability distribution is *most* accurate?

✓ **A)** Five percent of the normal curve probability is more than two standard deviations from the mean.

✗ **B)** The normal curve is asymmetrical about its mean.

✗ **C)** Sixty-eight percent of the area under the normal curve falls between the mean and 1 standard deviation above the mean.

Explanation

The normal curve is symmetrical about its mean with 34% of the area under the normal curve falling between the mean and one standard deviation above the mean. Ninety-five percent of the normal curve is within two standard deviations of the mean, so five percent of the normal curve falls outside two standard deviations from the mean.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #131 of 193

Question ID: 413273

The range of possible values in which an actual population parameter may be observed at a given level of probability is known as a:

✗ **A)** significance level.

✓ **B)** confidence interval.

✗ **C)** degree of confidence.

Explanation

A confidence interval is a range of values within which the actual value of a parameter will lie, given a specified probability level. A point estimate is a single value used to estimate a population parameter. An example of a point estimate is a sample mean. The degree of confidence is the confidence level associated with a confidence interval and is computed as 1 − a.

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #132 of 193

Question ID: 413222

Mei Tekei just celebrated her 22nd birthday. When she is 27, she will receive a $100,000 inheritance. Tekei needs funds for the down payment on a co-op in Manhattan and has found a bank that will give her the present value of her inheritance amount, assuming an 8.0% stated annual interest rate with continuous compounding. Will the proceeds from the bank be sufficient to cover her down payment of $65,000?

- ✗ **A)** No, Tekei will only receive $61,878.
- ✗ **B)** Yes, Tekei will receive $68,058.
- ✓ **C)** Yes, Tekei will receive $67,028.

Explanation

Because the rate is 8% compounded continuously, the effective annual rate is $e^{0.08}$ - 1 = 8.33%. To find the present value of the inheritance, enter N=5, I/Y=8.33, PMT=0, FV=100,000 CPT PV = 67,028.

Alternatively, $100{,}000e^{-0.08(5)}$ = 67,032.

References

Question From: Session 3 > Reading 10 > LOS p

Related Material:

- Key Concepts by LOS

Question #133 of 193

Question ID: 413255

Which of the following is NOT a prediction of the central limit theorem?

- ✗ **A)** The mean of the sampling distribution of the sample means will be equal to the population mean.
- ✓ **B)** The standard error of the sample mean will increase as the sample size increases.
- ✗ **C)** The variance of the sampling distribution of sample means will approach the population variance divided by the sample size.

Explanation

The standard error of the sample mean is equal to the sample standard deviation divided by the square root of the sample size. As the sample size increases, this ratio decreases. The other two choices are predictions of the central limit theorem.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #134 of 193

Question ID: 710144

Which of the following statements about a confidence interval for a population mean is *most* accurate?

✓ **A)** For a sample size of 30, using a *t*-statistic will result in a wider confidence interval for a population mean than using a *z*-statistic.

✗ **B)** If the population variance is unknown, a large sample size is required in order to estimate a confidence interval for the population mean.

✗ **C)** When a *z*-statistic is acceptable, a 95% confidence interval for a population mean is the sample mean plus-or-minus 1.96 times the sample standard deviation.

Explanation

Although the *t*-distribution begins to approach the shape of a normal distribution for large sample sizes, at a sample size of 30 a *t*-statistic produces a wider confidence interval than a *z*-statistic. A confidence interval for the population mean is the sample mean plus-or-minus the appropriate critical value times the *standard error*, which is the standard deviation divided by the square root of the sample size. If a population is normally distributed, we can use a *t*-statistic to construct a confidence interval for the population mean from a small sample, even if the population variance is unknown.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #135 of 193

Question ID: 413289

Construct a 90% confidence interval for the mean starting salaries of the CFA charterholders if a sample of 100 recent CFA charterholders gives a mean of 50. Assume that the population variance is 900. All measurements are in $1,000.

✗ **A)** 50 ± 1.645(30).

✗ **B)** 50 ± 1.645(900).

✓ **C)** 50 ± 1.645(3).

Explanation

Because we can compute the population standard deviation, we use the z-statistic. A 90% confidence level is constructed by taking the population mean and adding and subtracting the product of the z-statistic reliability ($z_{\alpha/2}$) factor times the known standard deviation of the population divided by the square root of the sample size (note that the population variance is given and its positive square root is the standard deviation of the population): $x \pm z_{\alpha/2} \times (\sigma / n^{1/2}) = 50 \pm 1.645 \times (900^{1/2} / 100^{1/2}) = 50 \pm 1.645 \times (30 / 10) = 50 \pm 1.645 \times (3)$. This is interpreted to mean that we are 90% confident that the above interval contains the true mean starting salaries of CFA charterholders.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #136 of 193

Question ID: 413283

Which statement *best* describes the properties of Student's t-distribution? The t-distribution is:

✓ **A)** symmetrical, and defined by a single parameter.

✗ **B)** skewed, and defined by a single parameter.

✗ **C)** symmetrical, and defined by two parameters.

Explanation

The t-distribution is symmetrical like the normal distribution but unlike the normal distribution is defined by a single parameter known as the degrees of freedom.

References

Question From: Session 3 > Reading 11 > LOS i

Related Material:

- Key Concepts by LOS

Question #137 of 193

Question ID: 413265

The following data are available on a sample of advertising budgets of 81 U.S. manufacturing companies: The mean budget is \$10 million. The sample variance is 36 million. The standard error of the sample mean is:

✗ **A)** \$1,111.

✗ **B)** \$400.

✓ **C)** \$667.

Explanation

The sample standard deviation is the square root of the variance: $(36{,}000{,}000)^{1/2}$ = \$6,000. The standard error of the sample mean is estimated by dividing the standard deviation of the sample by the square root of the sample size: $\sigma_{mean} = s / (n)^{1/2} = 6{,}000 / (81)^{1/2}$ = \$667.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #138 of 193

Question ID: 413173

A discount brokerage firm states that the time between a customer order for a trade and the execution of the order is uniformly distributed between three minutes and fifteen minutes. If a customer orders a trade at 11:54 A.M., what is the probability that the order is executed after noon?

- ✗ **A)** 0.500.
- ✓ **B)** 0.750.
- ✗ **C)** 0.250.

Explanation

The limits of the uniform distribution are three and 15. Since the problem concerns time, it is continuous. Noon is six minutes after 11:54 A.M. The probability the order is executed after noon is (15 − 6) / (15 − 3) = 0.75.

References

Question From: Session 3 > Reading 10 > LOS i

Related Material:

- Key Concepts by LOS

Question #139 of 193

Question ID: 413177

Which of the following statements about a normal distribution is *least* accurate?

- ✓ **A)** Approximately 34% of the observations fall within plus or minus one standard deviation of the mean.
- ✗ **B)** The distribution is completely described by its mean and variance.
- ✗ **C)** Kurtosis is equal to 3.

Explanation

Approximately 68% of the observations fall within one standard deviation of the mean. Approximately 34% of the observations fall within the mean plus one standard deviation (or the mean minus one standard deviation).

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #140 of 193

Question ID: 413240

Sampling error is the:

- ✗ **A)** difference between the point estimate of the mean and the mean of the sampling distribution.
- ✗ **B)** estimation error created by using a non-random sample.
- ✓ **C)** difference between a sample statistic and its corresponding population parameter.

Explanation

Sampling error is the difference between any sample statistic (the mean, variance, or standard deviation of the sample) and its corresponding population parameter (the mean, variance or standard deviation of the population). For example, the sampling error for the mean is equal to the sample mean minus the population mean.

References

Question From: Session 3 > Reading 11 > LOS b

Related Material:

- Key Concepts by LOS

Question #141 of 193

Question ID: 413138

Which of the following statements about probability distributions is *least* accurate?

- ✗ **A)** A probability distribution includes a listing of all the possible outcomes of an experiment.
- ✓ **B)** A probability distribution is, by definition, normally distributed.
- ✗ **C)** In a binomial distribution each observation has only two possible outcomes that are mutually exclusive.

Explanation

Probabilities must be zero or positive, but a probability distribution is not necessarily normally distributed. Binomial distributions are either successes or failures.

References

Question From: Session 3 > Reading 10 > LOS a

Related Material:

- Key Concepts by LOS

Question #142 of 193

Question ID: 413193

A stock portfolio has had a historical average annual return of 12% and a standard deviation of 20%. The returns are normally distributed. The range -27.2 to 51.2% describes a:

- ✗ **A)** 99% confidence interval.
- ✗ **B)** 68% confidence interval.
- ✓ **C)** 95% confidence interval.

Explanation

The upper limit of the range, 51.2%, is (51.2 − 12) = 39.2 / 20 = 1.96 standard deviations above the mean of 12. The lower limit of the range is (12 − (-27.2)) = 39.2 / 20 = 1.96 standard deviations below the mean of 12. A 95% confidence level is defined by a range 1.96 standard deviations above and below the mean.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #143 of 193

Question ID: 413280

Which one of the following distributions is described entirely by the degrees of freedom?

- ✗ **A)** Normal distribution.
- ✓ **B)** Student's t-distribution.
- ✗ **C)** Lognormal distribution.

Explanation

Student's t-distribution is defined by a single parameter known as the degrees of freedom.

References

Question From: Session 3 > Reading 11 > LOS i

Related Material:

- Key Concepts by LOS

Question #144 of 193

Question ID: 413305

In which one of the following cases is the t-statistic the appropriate one to use in the construction of a confidence interval for the population mean?

✗ **A)** The distribution is normal, the population variance is known, and the sample size is less than 30.

✓ **B)** The distribution is nonnormal, the population variance is unknown, and the sample size is at least 30.

✗ **C)** The distribution is nonnormal, the population variance is known, and the sample size is at least 30.

Explanation

The t-distribution is the theoretically correct distribution to use when constructing a confidence interval for the mean when the distribution is nonnormal and the population variance is unknown but the sample size is at least 30.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #145 of 193

Question ID: 413211

Which of the following portfolios provides the optimal "safety first" return if the minimum acceptable return is 9%?

Portfolio	*Expected Return (%)*	*Standard Deviation (%)*
1	13	5
2	11	3
3	9	2

✓ **A)** 1.

✗ **B)** 2.

✗ **C)** 3.

Explanation

Roy's safety-first criterion requires the maximization of the SF Ratio:
SF Ratio = (expected return - threshold return) / standard deviation

Portfolio	*Expected Return (%)*	*Standard Deviation (%)*	*SF Ratio*
1	13	5	0.80
2	11	3	0.67
3	9	2	0.00

Portfolio #1 has the highest safety-first ratio at 0.80.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #146 of 193

Question ID: 413262

From a population with a known standard deviation of 15, a sample of 25 observations is taken. Calculate the standard error of the sample mean.

- ✗ **A)** 1.67.
- ✗ **B)** 0.60.
- ✓ **C)** 3.00.

Explanation

The standard error of the sample mean equals the standard deviation of the population divided by the square root of the sample size: s_x = $s / n^{1/2}$ = $15 / 25^{1/2}$ = 3.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #147 of 193

Question ID: 413250

Monthly Gross Domestic Product (GDP) figures from 1990-2000 are an example of:

- ✗ **A)** cross-sectional data.
- ✓ **B)** time-series data.
- ✗ **C)** systematic data.

Explanation

A time-series is a group of observations taken at specific and equally spaced points in time. Cross-sectional data are observations taken at a single point in time.

References

Question From: Session 3 > Reading 11 > LOS d

Related Material:

- Key Concepts by LOS

Question #148 of 193

Question ID: 413200

Standardizing a normally distributed random variable requires the:

- ✗ **A)** mean, variance and skewness.
- ✓ **B)** mean and the standard deviation.
- ✗ **C)** natural logarithm of X.

Explanation

All that is necessary is to know the mean and the variance. Subtracting the mean from the random variable and dividing the difference by the standard deviation standardizes the variable.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #149 of 193

Question ID: 413143

Which of the following is *least likely* to be an example of a discrete random variable?

- ✓ **A)** The rate of return on a real estate investment.
- ✗ **B)** The number of days of sunshine in the month of May 2006 in a particular city.
- ✗ **C)** Quoted stock prices on the NASDAQ.

Explanation

The rate of return on a real estate investment, or any other investment, is an example of a continuous random variable because the possible outcomes of rates of return are infinite (e.g., 10.0%, 10.01%, 10.001%, etc.). Both of the other choices are measurable (countable).

References

Question From: Session 3 > Reading 10 > LOS b

Related Material:

- Key Concepts by LOS

Question #150 of 193

Question ID: 413188

A client will move his investment account unless the portfolio manager earns at least a 10% rate of return on his account. The rate of return for the portfolio that the portfolio manager has chosen has a normal probability distribution with an expected return of 19% and a standard deviation of 4.5%. What is the probability that the portfolio manager will keep this account?

- ✓ **A)** 0.977.
- ✗ **B)** 0.750.
- ✗ **C)** 0.950.

Explanation

Since we are only concerned with values that are below a 10% return this is a 1 tailed test to the left of the mean on the normal curve. With $\mu = 19$ and $\sigma = 4.5$, $P(X \geq 10) = P(X \geq \mu - 2\sigma)$ therefore looking up -2 on the cumulative Z table gives us a value of 0.0228, meaning that $(1 - 0.0228) = 97.72\%$ of the area under the normal curve is above a Z score of -2. Since the Z score of -2 corresponds with the lower level 10% rate of return of the portfolio this means that there is a 97.72% probability that the portfolio will earn at least a 10% rate of return.

References

Question From: Session 3 > Reading 10 > LOS l

Related Material:

- Key Concepts by LOS

Question #151 of 193

Question ID: 413307

Which of the following would result in a wider confidence interval? A:

- ✗ **A)** greater level of significance.
- ✗ **B)** higher alpha level.
- ✓ **C)** higher degree of confidence.

Explanation

A higher degree of confidence (e.g. 99% instead of 95%) would require a higher reliability factor (2.575 instead of 1.96 assuming a normal distribution). A wider confidence interval corresponds to a lower alpha significance level and the point estimate does not affect the width of the confidence interval.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #152 of 193

Question ID: 413239

The sampling distribution of a statistic is:

- ✗ **A)** the same as the probability distribution of the underlying population.
- ✗ **B)** always a standard normal distribution.
- ✓ **C)** the probability distribution consisting of all possible sample statistics computed from samples of the same size drawn from the same population.

Explanation

A sample statistic itself is a random variable, so it also has a probability distribution. For example, suppose we start with a sample of the prices of 200 stocks, and we calculate the sample mean of a random sample of 40 of those stocks. If we repeat this many times, we will have many different estimates of the sample mean. The distribution of these estimates of the mean is the sampling distribution of the mean. A statistic's sampling distribution is not necessarily normal or the same as that of the population.

References

Question From: Session 3 > Reading 11 > LOS a

Related Material:

- Key Concepts by LOS

Question #153 of 193

Question ID: 413244

Which of the following is *least likely* a step in stratified random sampling?

- ✗ **A)** The population is divided into strata based on some classification scheme.
- ✗ **B)** The sub-samples are pooled to create the complete sample.
- ✓ **C)** The size of each sub-sample is selected to be the same across strata.

Explanation

In stratified random sampling we first divide the population into subgroups, called strata, based on some classification scheme. Then we randomly select a sample from each stratum and pool the results. *The size of the samples from each strata is based on the relative size of the strata relative to the population and are not necessarily the same across strata.*

References

Question From: Session 3 > Reading 11 > LOS c

Related Material:

- Key Concepts by LOS

Question #154 of 193

Question ID: 498735

Bill Phillips is developing a Monte Carlo simulation to value a complex and thinly traded security. Phillips wants to model one input variable to have negative skewness and a second input variable to have positive excess kurtosis. In a Monte Carlo simulation, Phillips can appropriately use:

- ✗ **A)** only one of these variables.
- ✓ **B)** both of these variables.
- ✗ **C)** neither of these variables.

Explanation

One of the advantages of Monte Carlo simulation is that an analyst can specify any distribution for inputs.

References

Question From: Session 3 > Reading 10 > LOS q

Related Material:

- Key Concepts by LOS

Question #155 of 193

Question ID: 413279

With 60 observations, what is the appropriate number of degrees of freedom to use when carrying out a statistical test on the mean of a population?

- ✓ **A)** 59.
- ✗ **B)** 61.
- ✗ **C)** 60.

Explanation

When performing a statistical test on the mean of a population based on a sample of size n, the number of degrees of freedom is n - 1 since once the mean is estimated from a sample there are only n - 1 observations that are free to vary. In this case the appropriate number of degrees of freedom to use is 60 - 1 = 59.

References

Question From: Session 3 > Reading 11 > LOS i

Related Material:

- Key Concepts by LOS

Question #156 of 193

Question ID: 413233

Many analysts prefer to use Monte Carlo simulation rather than historical simulation because:

- ✗ **A)** computers can manipulate theoretical data much more quickly than historical data.
- ✗ **B)** it is much easier to generate the required variables.
- ✓ **C)** past distributions cannot address changes in correlations or events that have not happened before.

Explanation

While the past is often a good predictor of the future, simulations based on past distributions are limited to reflecting changes and events that actually occurred. Monte Carlo simulation can be used to model based on parameters that are not limited to past experience.

References

Question From: Session 3 > Reading 10 > LOS r

Related Material:

- Key Concepts by LOS

Question #157 of 193

Question ID: 413209

If the threshold return is higher than the risk-free rate, what will be the relationship between Roy's safety-first ratio (SF) and Sharpe's ratio?

- ✓ **A)** The SF ratio will be lower.
- ✗ **B)** The SF ratio will be higher.
- ✗ **C)** The SF ratio may be higher or lower depending on the standard deviation.

Explanation

Since each ratio has the standard deviation of returns in the denominator, the difference depends upon the effect on the numerator. Since both the risk-free rate (in the Sharpe ratio) and the threshold rate (in the SF ratio) are subtracted from the expected return, a larger threshold rate would result in a smaller SF ratio value.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #158 of 193

Question ID: 529151

An equity analyst needs to select a representative sample of manufacturing stocks. Starting with the population of all publicly traded manufacturing stocks, she classifies each stock into one of the 20 industry groups that form the Index of Industrial Production for the manufacturing industry. She then selects four stocks from each industry. The sampling method the analyst is using is *best* characterized as:

- ✓ **A)** stratified random sampling.

✗ **B)** random sampling.

✗ **C)** nonrandom sampling.

Explanation

In stratified random sampling, a researcher classifies a population into smaller groups based on one or more characteristics, takes a simple random sample from each subgroup, and pools the results.

References

Question From: Session 3 > Reading 11 > LOS c

Related Material:

- Key Concepts by LOS

Question #159 of 193

Question ID: 434213

A nursery sells trees of different types and heights. Suppose that 75 trees chosen at random are sold for planting at City Hall. These 75 trees average 60 inches in height with a standard deviation of 16 inches.

Using this information, construct a 95% confidence interval for the mean height of all trees in the nursery.

✗ **A)** 0.8 $\pm$ 1.96(16).

✓ **B)** 60 $\pm$ 1.96(1.85).

✗ **C)** 60 $\pm$ 1.96(16).

Explanation

Because the sample size is sufficiently large, we can use the ***z***-statistic. A 95% confidence level is constructed by taking the sample mean and adding and subtracting the product of the ***z***-statistic reliability factor ($z_{\alpha/2}$) times the standard error of the sample mean: $x \pm z_{\alpha/2} \times (s / n^{1/2}) = 60 \pm (1.96) \times (16 / 75^{1/2}) = 60 \pm (1.96) \times (16 / 8.6603) = 60 \pm (1.96) \times (1.85)$.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #160 of 193

Question ID: 413184

In addition to the usual parameters that describe a normal distribution, to completely describe 10 random variables, a multivariate normal distribution requires knowing the:

✗ **A)** 10 correlations.

✗ **B)** overall correlation.

✓ **C)** 45 correlations.

Explanation

The number of correlations in a multivariate normal distribution of *n* variables is computed by the formula ((n) × (n-1)) / 2, in this case (10 × 9) / 2 = 45.

References

Question From: Session 3 > Reading 10 > LOS k

Related Material:

- Key Concepts by LOS

Question #161 of 193

Question ID: 413172

The probability density function of a continuous uniform distribution is *best* described by a:

✗ **A)** line segment with a curvilinear slope.

✗ **B)** line segment with a 45-degree slope.

✓ **C)** horizontal line segment.

Explanation

By definition, for a continuous uniform distribution, the probability density function is a horizontal line segment over a range of values such that the area under the segment (total probability of an outcome in the range) equals one.

References

Question From: Session 3 > Reading 10 > LOS i

Related Material:

- Key Concepts by LOS

Question #162 of 193

Question ID: 413319

Studies of performance of a sample of mutual fund managers *most likely* suffer from:

✓ **A)** survivorship bias.

✗ **B)** look-ahead bias.

✗ **C)** sample-selection bias.

Explanation

Studies of the performance of mutual fund managers often suffer from survivorship bias as poorly performing funds are closed down and are not included in the sample.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #163 of 193

Question ID: 413235

A drawback of historical simulation is it:

- ✗ **A)** may not accurately reflect possible outcomes.
- ✗ **B)** depends on the accuracy of the random number generator.
- ✓ **C)** may not account for very rare events.

Explanation

There are two major problems with historical simulation. The first is that it cannot account for events that do not occur in the sample. If a security began trading after 1987, for example, there would be no evidence of its behavior in a market crash. The other drawback is that the analyst cannot change the parameters of the distribution to examine how small changes might affect the asset's behavior.

References

Question From: Session 3 > Reading 10 > LOS r

Related Material:

- Key Concepts by LOS

Question #164 of 193

Question ID: 413232

The difference between a Monte Carlo simulation and a historical simulation is that a historical simulation uses randomly selected variables from past distributions, while a Monte Carlo simulation:

- ✗ **A)** uses randomly selected variables from future distributions.
- ✗ **B)** projects variables based on *a priori* principles.
- ✓ **C)** uses a computer to generate random variables.

Explanation

A Monte Carlo simulation uses a computer to generate random variables from specified distributions.

References

Question From: Session 3 > Reading 10 > LOS r

Related Material:

- Key Concepts by LOS

Question #165 of 193

Question ID: 413150

A random variable X is continuous and bounded between zero and five, X:($0 \leq X \leq 5$). The cumulative distribution function (cdf) for X is $F(x) = x / 5$. Calculate $P(2 \leq X \leq 4)$.

- ✗ **A)** 0.50.
- ✗ **B)** 1.00.
- ✓ **C)** 0.40.

Explanation

For a continuous distribution, $P(a \leq X \leq b) = F(b) - F(a)$. Here, $F(4) = 0.8$ and $F(2) = 0.4$. Note also that this is a uniform distribution over $0 \leq x \leq 5$ so $Prob(2 < x < 4) = (4 - 2) / 5 = 40\%$.

References

Question From: Session 3 > Reading 10 > LOS d

Related Material:

- Key Concepts by LOS

Question #166 of 193

Question ID: 413272

The sample mean is an unbiased estimator of the population mean because the:

- ✓ **A)** expected value of the sample mean is equal to the population mean.
- ✗ **B)** sampling distribution of the sample mean has the smallest variance of any other unbiased estimators of the population mean.
- ✗ **C)** sample mean provides a more accurate estimate of the population mean as the sample size increases.

Explanation

An unbiased estimator is one for which the expected value of the estimator is equal to the parameter you are trying to estimate.

References

Question From: Session 3 > Reading 11 > LOS g

Related Material:

- Key Concepts by LOS

Question #167 of 193

Question ID: 413321

When sampling from a nonnormal distribution with an known variance, which statistic should be used if the sample size is *large* and if the respective sample size is *small*?

- ✗ **A)** *t*-statistic; *t*-statistic.
- ✗ **B)** *z*-statistic; *z*-statistic.
- ✓ **C)** *z*-statistic; not available.

Explanation

When you are sampling from a:	and the sample size is small, use a:	and the sample size is large, use a:
Normal distribution with a *known* variance	*z*-statistic	*z*-statistic
Normal distribution with an *unknown* variance	*t*-statistic	*t*-statistic*
Nonnormal distribution with a *known* variance	not available	*z*-statistic
Nonnormal distribution with an *unknown* variance	not available	*t*-statistic*

*The *z*-statistic is theoretically acceptable here, but use of the *t*-statistic is more conservative.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #168 of 193

Question ID: 413163

A stock priced at $100 has a 70% probability of moving up and a 30% probability of moving down. If it moves up, it increases by a factor of 1.02. If it moves down, it decreases by a factor of 1/1.02. What is the probability that the stock will be $100 after two successive periods?

- ✓ **A)** 42%.
- ✗ **B)** 21%.
- ✗ **C)** 9%.

Explanation

For the stock to be $100 after two periods, it must move up once and move down once: $100 × 1.02 × (1/1.02) = $100. This can happen in one of two ways: 1) the stock moves up during period one and down during period two; or 2) the stock moves down during period one and up during period two. The probability of either event is 0.70 × 0.30 = 0.21. The combined probability of either event is 2(0.21) = 0.42 or 42%.

References

Question From: Session 3 > Reading 10 > LOS g

Related Material:

- Key Concepts by LOS

Question #169 of 193

Question ID: 413176

A normal distribution is completely described by its:

- ✗ **A)** mean, mode, and skewness.
- ✗ **B)** median and mode.
- ✓ **C)** variance and mean.

Explanation

By definition, a normal distribution is completely described by its mean and variance.

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #170 of 193

Question ID: 413310

An analyst has reviewed market data for returns from 1980-1990 extensively, searching for patterns in the returns. She has found that when the end of the month falls on a Saturday, there are usually positive returns on the following Thursday. She has engaged in:

- ✓ **A)** data mining.
- ✗ **B)** data snooping.
- ✗ **C)** biased selection.

Explanation

Data mining refers to the extensive review of the same database searching for patterns.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #171 of 193

Question ID: 413274

Which of the following characterizes the typical construction of a confidence interval *most* accurately?

✗ **A)** Point estimate +/- (Standard error / Reliability factor).

✓ **B)** Point estimate +/- (Reliability factor x Standard error).

✗ **C)** Standard error +/- (Point estimate / Reliability factor).

Explanation

We can construct a confidence interval by adding and subtracting some amount from the point estimate. In general, confidence intervals have the following form:

Point estimate +/- Reliability factor x Standard error

Point estimate = the value of a sample statistic of the population parameter

Reliability factor = a number that depends on the sampling distribution of the point estimate and the probability the point estimate falls in the confidence interval (1 - α)

Standard error = the standard error of the point estimate

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #172 of 193

Question ID: 413246

An analyst divides the population of U.S. stocks into 10 equally sized sub-samples based on market value of equity. Then he takes a random sample of 50 from each of the 10 sub-samples and pools the data to create a sample of 500. This is an example of:

✓ **A)** stratified random sampling.

✗ **B)** simple random sampling.

✗ **C)** systematic cross-sectional sampling.

Explanation

In stratified random sampling we first divide the population into subgroups, called strata, based on some classification scheme. Then we randomly select a sample from each stratum and pool the results. The size of the samples from each strata is based on the relative size of the strata relative to the population. Simple random sampling is a method of selecting a sample in such a way that each item or person in the population being studied has the same (non-zero) likelihood of being included in the sample.

References

Question From: Session 3 > Reading 11 > LOS c

Related Material:

- Key Concepts by LOS

Question #173 of 193

Question ID: 413318

A scientist working for a pharmaceutical company tries many models using the same data before reporting the one that shows that the given drug has no serious side effects. The scientist is guilty of:

- ✗ **A)** look-ahead bias.
- ✗ **B)** sample selection bias.
- ✓ **C)** data mining.

Explanation

Data mining is the process where the same data is used with different methods until the desired results are obtained.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #174 of 193

Question ID: 413157

Which of the following is NOT an assumption of the binomial distribution?

- ✗ **A)** The trials are independent.
- ✓ **B)** The expected value is a whole number.
- ✗ **C)** Random variable X is discrete.

Explanation

The expected value is n × p. A simple example shows us that the expected value does not have to be a whole number: n = 5, p = 0.5, n × p = 2.5. The other conditions are necessary for the binomial distribution.

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #175 of 193

Question ID: 452012

The central limit theorem concerns the sampling distribution of the:

- ✗ **A)** population mean.

✓ **B)** sample mean.

✗ **C)** sample standard deviation.

Explanation

The central limit theorem tells us that for a population with a mean m and a finite variance σ^2, the sampling distribution of the *sample means* of all possible samples of size n will approach a normal distribution with a mean equal to μ and a variance equal to σ^2 / n as *n* gets large.

References

Question From: Session 3 > Reading 11 > LOS e

Related Material:

- Key Concepts by LOS

Question #176 of 193

Question ID: 413144

Assume a discrete distribution for the number of possible sunny days in Provo, Utah during the week of April 20 through April 26. For this discrete distribution, p(x) = 0 when x cannot occur, or p(x) > 0 if it can. Based on this information, what is the probability of it being sunny on 5 days and on 10 days during the week, respectively?

✓ **A)** A positive value; zero.

✗ **B)** Zero; infinite.

✗ **C)** A positive value; infinite.

Explanation

The probability of it being sunny on 5 days during the week has some positive value, but the probability of having sunshine 10 days within a week of 7 days is zero because this cannot occur.

References

Question From: Session 3 > Reading 10 > LOS b

Related Material:

- Key Concepts by LOS

Question #177 of 193

Question ID: 413275

A range of estimated values within which the actual value of a population parameter will lie with a given probability of 1 − α is a(n):

✗ **A)** α percent point estimate.

✗ **B)** α percent confidence interval.

✓ **C)** (1 − α) percent confidence interval.

Explanation

A 95% confidence interval for the population mean (α = 5%), for example, is a range of estimates within which the actual value of the population mean will lie with a probability of 95%. Point estimates, on the other hand, are *single* (sample) values used to estimate population parameters. There is no such thing as a α percent *point estimate* or a (1 − α) percent *cross-sectional point estimate.*

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #178 of 193

Question ID: 413201

Which of the following represents the mean, standard deviation, and variance of a standard normal distribution?

✗ **A)** 1, 1, 1.

✗ **B)** 1, 2, 4.

✓ **C)** 0, 1, 1.

Explanation

By definition, for the standard normal distribution, the mean, standard deviation, and variance are 0, 1, 1.

References

Question From: Session 3 > Reading 10 > LOS m

Related Material:

- Key Concepts by LOS

Question #179 of 193

Question ID: 413219

The farthest point on the left side of the lognormal distribution:

✗ **A)** can be any negative number.

✗ **B)** is skewed to the left.

✓ **C)** is bounded by 0.

Explanation

The lognormal distribution is skewed to the right with a long right hand tail and is bounded on the left hand side of the curve by zero.

References

Question From: Session 3 > Reading 10 > LOS o

Related Material:

- Key Concepts by LOS

Question #180 of 193

Question ID: 413218

Which of the following statements regarding the distribution of returns used for asset pricing models is *most* accurate?

- ✓ **A)** Lognormal distribution returns are used for asset pricing models because they will not result in an asset return of less than -100%.
- ✗ **B)** Normal distribution returns are used for asset pricing models because they will only allow the asset price to fall to zero.
- ✗ **C)** Lognormal distribution returns are used because this will allow for negative returns on the assets.

Explanation

Lognormal distribution returns are used for asset pricing models because this will not result in asset returns of less than 100% because the lowest the asset price can decrease to is zero which is the lowest value on the lognormal distribution. The normal distribution allows for asset prices less than zero which could result in a return of less than -100% which is impossible.

References

Question From: Session 3 > Reading 10 > LOS o

Related Material:

- Key Concepts by LOS

Question #181 of 193

Question ID: 413271

The sample mean is a consistent estimator of the population mean because the:

- ✓ **A)** sample mean provides a more accurate estimate of the population mean as the sample size increases.
- ✗ **B)** expected value of the sample mean is equal to the population mean.
- ✗ **C)** sampling distribution of the sample mean has the smallest variance of any other unbiased estimators of the population mean.

Explanation

A consistent estimator provides a more accurate estimate of the parameter as the sample size increases.

References

Question From: Session 3 > Reading 11 > LOS g

Related Material:

- Key Concepts by LOS

Question #182 of 193

Question ID: 413320

Which of the following statements about sample statistics is *least* accurate?

✓ **A)** There is no sample statistic for non-normal distributions with unknown variance for either small or large samples.

✗ **B)** The *z*-statistic is used for nonnormal distributions with known variance, but only for large samples.

✗ **C)** The *z*-statistic is used to test normally distributed data with a known variance, whether testing a large or a small sample.

Explanation

There is no sample statistic for non-normal distributions with unknown variance for small samples, but the t-statistic is used when the sample size is large.

References

Question From: Session 3 > Reading 11 > LOS k

Related Material:

- Key Concepts by LOS

Question #183 of 193

Question ID: 413290

What is the 95% confidence interval for a population mean with a known population variance of 9, based on a sample of 400 observations with mean of 96?

✗ **A)** 95.118 to 96.882.

✗ **B)** 95.613 to 96.387.

✓ **C)** 95.706 to 96.294.

Explanation

Because we can compute the population standard deviation, we use the z-statistic. A 95% confidence level is constructed by taking the population mean and adding and subtracting the product of the z-statistic reliability ($z_{\alpha/2}$) factor times the known standard deviation of the population divided by the square root of the sample size (note that the population variance is given and its positive square root is the standard deviation of the population): $x \pm z_{\alpha/2} \times (\sigma / n^{1/2}) = 96 \pm 1.96 \times (9^{1/2} / 400^{1/2}) = 96 \pm 1.96 \times (0.15) = 96 \pm 0.294 = 95.706$ to 96.294.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #184 of 193

Question ID: 413148

A probability function:

✗ **A)** only applies to continuous distributions.

✓ **B)** specifies the probability that the random variable takes on a specific value.

✗ **C)** is often referred to as the "cdf."

Explanation

This is true by definition.

References

Question From: Session 3 > Reading 10 > LOS c

Related Material:

- Key Concepts by LOS

Question #185 of 193

Question ID: 413266

A population has a mean of 20,000 and a standard deviation of 1,000. Samples of size n = 2,500 are taken from this population. What is the standard error of the sample mean?

✗ **A)** 400.00.

✓ **B)** 20.00.

✗ **C)** 0.04.

Explanation

The standard error of the sample mean is estimated by dividing the standard deviation of the sample by the square root of the sample size: $s_x = s / n^{1/2} = 1000 / (2500)^{1/2} = 1000 / 50 = 20$.

References

Question From: Session 3 > Reading 11 > LOS f

Related Material:

- Key Concepts by LOS

Question #186 of 193

Question ID: 413213

Three portfolios with normally distributed returns are available to an investor who wants to minimize the probability that the portfolio return will be less than 5%. The risk and return characteristics of these portfolios are shown in the following table:

Portfolio	*Expected return*	*Standard deviation*
Epps	6%	4%
Flake	7%	9%
Grant	10%	15%

Based on Roy's safety-first criterion, which portfolio should the investor select?

- ✗ **A)** Epps.
- ✓ **B)** Grant.
- ✗ **C)** Flake.

Explanation

Roy's safety-first ratios for the three portfolios:

Epps = (6 - 5) / 4 = 0.25
Flake = (7 - 5) / 9 = 0.222
Grant = (10 - 5) / 15 = 0.33

The portfolio with the largest safety-first ratio has the lowest probability of a return less than 5%. The investor should select the Grant portfolio.

References

Question From: Session 3 > Reading 10 > LOS n

Related Material:

- Key Concepts by LOS

Question #187 of 193

Question ID: 434216

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690

A random sample of 25 Indiana farms had a mean number of cattle per farm of 27 with a sample standard deviation of five.

Assuming the population is normally distributed, what would be the 95% confidence interval for the number of cattle per farm?

- ✗ **A)** 23 to 31.
- ✓ **B)** 25 to 29.
- ✗ **C)** 22 to 32.

Explanation

The standard error of the sample mean = 5 / √25 = 1
Degrees of freedom = 25 − 1 = 24
From Student's t-table, $t_{5/2}$ = 2.064
The confidence interval is: 27 ± 2.064(1) = 24.94 to 29.06 or 25 to 29.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #188 of 193

Question ID: 413159

A casual laborer has a 70% chance of finding work on each day that she reports to the day labor marketplace. What is the probability that she will work three days out of five?

- ✗ **A)** 0.6045.
- ✓ **B)** 0.3087.
- ✗ **C)** 0.3192.

Explanation

P(3) = 5! / [(5 - 3)! × 3!] × (0.7^3) × (0.3^2) = 0.3087 = 5 →2nd→ nCr → 3 × 0.343 × 0.09

References

Question From: Session 3 > Reading 10 > LOS f

Related Material:

- Key Concepts by LOS

Question #189 of 193

Question ID: 413179

The lower limit of a normal distribution is:

- ✓ **A)** negative infinity.
- ✗ **B)** zero.

✗ **C)** negative one.

Explanation

By definition, a true normal distribution has a positive probability density function from negative to positive infinity.

References

Question From: Session 3 > Reading 10 > LOS j

Related Material:

- Key Concepts by LOS

Question #190 of 193

Question ID: 413270

A statistical estimator is unbiased if:

✗ **A)** an increase in sample size decreases the standard error.

✗ **B)** the variance of its sampling distribution is smaller than that of all other estimators.

✓ **C)** the expected value of the estimator is equal to the population parameter.

Explanation

Desirable properties of an estimator are unbiasedness, efficiency, and consistency. An estimator is unbiased if its expected value is equal to the population parameter it is estimating. An estimator is efficient if the variance of its sampling distribution is smaller than that of all other unbiased estimators. An estimator is consistent if an increase in sample size decreases the standard error.

References

Question From: Session 3 > Reading 11 > LOS g

Related Material:

- Key Concepts by LOS

Question #191 of 193

Question ID: 413292

A sample size of 25 is selected from a normal population. This sample has a mean of 15 and the population variance is 4.

Using this information, construct a 95% confidence interval for the population mean, m.

✓ **A)** 15 ± 1.96(0.4).

✗ **B)** 15 ± 1.96(2).

✗ **C)** 15 ± 1.96(0.8).

Explanation

Because we can compute the population standard deviation, we use the z-statistic. A 95% confidence level is constructed by taking the population mean and adding and subtracting the product of the z-statistic reliability ($z_{\alpha/2}$) factor times the known standard deviation of the population divided by the square root of the sample size (note that the population variance is given and its positive square root is the standard deviation of the population): $x \pm z_{\alpha/2} \times (\sigma / n^{1/2}) = 15 \pm 1.96 \times (4^{1/2} / 25^{1/2}) = 15 \pm 1.96 \times (0.4)$.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS

Question #192 of 193

Question ID: 413277

Which of the following statements about sampling and estimation is *most* accurate?

✗ **A)** Time-series data are observations over individual units at a point in time.

✗ **B)** A confidence interval estimate consists of a range of values that bracket the parameter with a specified level of probability, $1 - \beta$.

✓ **C)** A point estimate is a single estimate of an unknown population parameter calculated as a sample mean.

Explanation

Time-series data are observations taken at specific and equally-spaced points.
A confidence interval estimate consists of a range of values that bracket the parameter with a specified level of probability, $1 - \alpha$.

References

Question From: Session 3 > Reading 11 > LOS h

Related Material:

- Key Concepts by LOS

Question #193 of 193

Question ID: 434211

Student's *t*-Distribution

Level of Significance for One-Tailed Test						
df	**0.100**	**0.050**	**0.025**	**0.01**	**0.005**	**0.0005**
Level of Significance for Two-Tailed Test						
df	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373

Based on Student's t-distribution, the 95% confidence interval for the population mean based on a sample of 40 interest rates with a sample mean of 4% and a sample standard deviation of 15% is *closest to:*

- ✓ **A)** -0.794% to 8.794%.
- ✗ **B)** -0.851% to 8.851%.
- ✗ **C)** 1.261% to 6.739%.

Explanation

The standard error for the mean = $s/(n)^{0.5}$ = $15\%/(40)^{0.5}$ = 2.372%. The critical value from the t-table should be based on 40 - 1 = 39 df. Since the standard tables do not provide the critical value for 39 df the closest available value is for 40 df. This leaves us with an approximate confidence interval. Based on 95% confidence and df = 40, the critical t-value is 2.021. Therefore the 95% confidence interval is approximately: 4% ± 2.021(2.372) or 4% ± 4.794% or -0.794% to 8.794%.

References

Question From: Session 3 > Reading 11 > LOS j

Related Material:

- Key Concepts by LOS