

### Question #1 of 74

Historically, which of the following asset classes has exhibited the smallest standard deviation of monthly returns?

- A) Large-capitalization stocks.
- B) Long-term corporate bonds.
- C) Treasury bills.



#### Explanation

Based on data for securities in the United States from 1926 to 2008, Treasury bills exhibited a lower standard deviation of monthly returns than both large-cap stocks and long-term corporate bonds.

(Study Session 12, Module 39.1, LOS 39.b)

### Question #2 of 74

In a two-asset portfolio, *reducing* the correlation between the two assets moves the efficient frontier in which direction?

- A) The efficient frontier is stable unless the asset's expected volatility changes. This depends on each asset's standard deviation.
- B) The frontier extends to the left, or northwest quadrant representing a reduction in risk while maintaining or enhancing portfolio returns.
- C) The efficient frontier is stable unless return expectations change. If expectations change, the efficient frontier will extend to the upper right with little or no change in risk.



#### Explanation

Reducing correlation between the two assets results in the efficient frontier expanding to the left and possibly slightly upward. This reflects the influence of correlation on reducing portfolio risk.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #3 of 74

Stock A has a standard deviation of 10.00. Stock B also has a standard deviation of 10.00. If the correlation coefficient between these stocks is - 1.00, what is the covariance between these two stocks?

- A) 1.00.
- B) -100.00.
- C) 0.00.



#### Explanation




Covariance = correlation coefficient  $\times$  standard deviation<sub>Stock 1</sub>  $\times$  standard deviation<sub>Stock 2</sub> = (-1.00)(10.00)(10.00) = -100.00.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #4 of 74

Which of the following statements about risk aversion is CORRECT?

- A) Risk averse investors will not take on risk. 
- B) Given a choice between two assets with equal rates of return, the investor will always select the asset with the lowest level of risk. 
- C) Risk aversion implies that the risk-return line, the CML, and the SML are downward sloping curves. 

#### Explanation




Risk aversion implies that an investor will not assume risk unless compensated.

(Study Session 12, Module 39.2, LOS 39.d)

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### Question #5 of 74

If the standard deviation of stock A is 13.2 percent, the standard deviation of stock B is 17.6 percent, and the covariance between the two is 0, what is the correlation coefficient?

- A) +1. 
- B) 0. 
- C) 0.31. 

#### Explanation

Since covariance is zero, the correlation coefficient must be zero.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #6 of 74

Which of the following portfolios falls below the Markowitz efficient frontier?

Portfolio	Expected Return	Expected Standard Deviation
A	7%	14%
B	9%	26%
C	15%	30%
D	12%	22%

- A) B. 

B) C.



C) D.



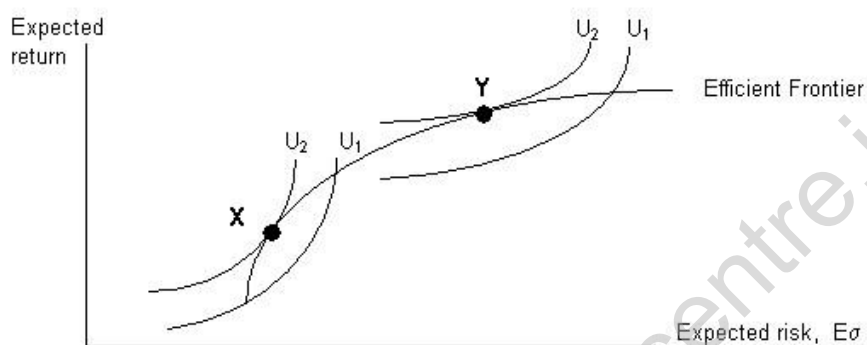
#### Explanation

Portfolio B is not on the efficient frontier because it has a lower return, but higher risk, than Portfolio D.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #7 of 74

The graph below combines the efficient frontier with the indifference curves for two different investors, X and Y.



Which of the following statements about the above graph is *least* accurate?

A) The efficient frontier line represents the portfolios that provide the highest return at each risk level.



B) Investor X's expected return will always be less than that of Investor Y.



C) Investor X is less risk-averse than Investor Y.



#### Explanation

Investor X has a steep indifference curve, indicating that he is risk-averse. Flatter indifference curves, such as those for Investor Y, indicate a less risk-averse investor. The other choices are true. A more risk-averse investor will likely obtain lower returns than a less risk-averse investor.

(Study Session 12, Module 39.3, LOS 39.h)

### Question #8 of 74

Which of the following statements about the optimal portfolio is NOT correct? The optimal portfolio:

A) lies at the point of tangency between the efficient frontier and the indifference curve with the highest possible utility.



B) is the portfolio that gives the investor the maximum level of return.



C) may be different for different investors.



#### Explanation

This statement is incorrect because it does not specify that risk must also be considered.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #9 of 74

Stock A has a standard deviation of 0.5 and Stock B has a standard deviation of 0.3. Stock A and Stock B are perfectly positively correlated. According to Markowitz portfolio theory how much should be invested in each stock to minimize the portfolio's standard deviation?

A) 30% in Stock A and 70% in Stock B.



B) 100% in Stock B.



C) 50% in Stock A and 50% in Stock B.



#### Explanation

Since the stocks are perfectly correlated, there is no benefit from diversification. So, invest in the stock with the lowest risk.

(Study Session 12, Module 39.3, LOS 39.f)

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### Question #10 of 74

Which of the following inputs is *least likely* required for the Markowitz efficient frontier? The:

A) level of risk aversion in the market.



B) expected return of all securities.



C) covariation between all securities.



#### Explanation

The level of risk aversion in the market is not a required input. The model requires that investors know the expected return and variance of each security as well as the covariance between all securities.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #11 of 74

Which one of the following portfolios *cannot* lie on the efficient frontier?

Portfolio	Expected Return	Standard Deviation
A	20%	35%
B	11%	13%
C	8%	10%
D	8%	9%

A) Portfolio A.



B) Portfolio C.



C) Portfolio D.



#### Explanation

Portfolio C cannot lie on the frontier because it has the same return as Portfolio D, but has more risk.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #12 of 74

Which of the following statements *best* describes an investment that is not on the efficient frontier?

A) The portfolio has a very high return.



B) There is a portfolio that has a lower return for the same risk.



C) There is a portfolio that has a lower risk for the same return.



#### Explanation

The efficient frontier outlines the set of portfolios that gives investors the highest return for a given level of risk or the lowest risk for a given level of return. Therefore, if a portfolio is not on the efficient frontier, there must be a portfolio that has lower risk for the same return. Equivalently, there must be a portfolio that produces a higher return for the same risk.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #13 of 74

Three portfolios have the following expected returns and risk:

Portfolio	Expected return	Standard deviation
Jones	4%	2%
Kelly	6%	5%
Lewis	7%	8%

A risk-averse investor choosing from these portfolios could rationally select:

A) any of these portfolios.



B) Jones or Kelly, but not Lewis.



C) Jones, but not Kelly or Lewis.



#### Explanation

Risk aversion means that to accept greater risk, an investor must be compensated with a higher expected return. For the three portfolios given, higher risk is associated with higher expected return. Therefore a risk-averse investor may select any of these portfolios. A risk-averse investor will not select a portfolio if another portfolio offers a higher expected return with the same risk, or lower risk with the same expected return.

(Study Session 12, Module 39.2, LOS 39.d)

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### Question #14 of 74

The optimal portfolio in the Markowitz framework occurs when an investor achieves the diversified portfolio with the:

- A) lowest risk.
- B) highest utility.
- C) highest return.



#### Explanation

The optimal portfolio in the Markowitz framework occurs when the investor achieves the diversified portfolio with the highest utility.

(Study Session 12, Module 39.3, LOS 39.h)

### Question #15 of 74

If the standard deviation of stock A is 7.2%, the standard deviation of stock B is 5.4%, and the covariance between the two is -0.0031, what is the correlation coefficient?

- A) -0.19.
- B) -0.80.
- C) -0.64.



#### Explanation

The formula is:  $\text{Covariance of A and B} / [(\text{Standard deviation of A})(\text{Standard Deviation of B})] = (\text{Correlation Coefficient of A and B}) = (-0.0031) / [(0.072)(0.054)] = -0.797$ .

(Study Session 12, Module 39.2, LOS 39.c)

### Question #16 of 74

Which of the following statements about portfolio theory is *least* accurate?

- A) For a two-stock portfolio, the lowest risk occurs when the correlation coefficient is close to negative one.
- B) Assuming that the correlation coefficient is less than one, the risk of the portfolio will always be less than the simple weighted average of individual stock risks.
- C) When the return on an asset added to a portfolio has a correlation coefficient of less than one with the other portfolio asset returns but has the same risk, adding the asset will not decrease the portfolio risk.



#### Explanation

When the return on an asset added to a portfolio has a correlation coefficient of less than one with the other portfolio asset returns but has the same risk, adding the asset *will* decrease the overall portfolio standard deviation. Any time the correlation coefficient is less than one, there are benefits from diversification. The other choices are true.

(Study Session 12, Module 39.3, LOS 39.f)

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### Question #17 of 74

Risk aversion means that if two assets have identical expected returns, an individual will choose the asset with the:

A) higher standard deviation.



B) shorter payback period.



C) lower risk level.



#### Explanation

Investors are *risk averse*. Given a choice between assets with equal rates of expected return, the investor will always select the asset with the lowest level of risk. This means that there is a positive relationship between expected returns (ER) and expected risk ( $E\sigma$ ) and the risk return line (capital market line [CML] and security market line [SML]) is upward sloping.

Standard deviation is a way to quantify risk. The payback period is used to evaluate capital projects, not investment returns.

(Study Session 12, Module 39.2, LOS 39.d)

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### Question #18 of 74

Using the following correlation matrix, which two stocks would combine to make the lowest-risk portfolio?

(Assume the stocks have equal risk and returns.)

Stock	A	B	C
A	+ 1	--	--
B	- 0.2	+ 1	--
C	+ 0.6	- 0.1	+ 1

A) A and C.



B) A and B.



C) C and B.



#### Explanation

Portfolios A and B have the lowest correlation coefficient and will thus create the lowest-risk portfolio.

The standard deviation of a portfolio =  $[W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{1/2}$

The correlation coefficient,  $r_{1,2}$ , varies from + 1 to - 1. The smaller the correlation coefficient, the smaller  $\sigma_{\text{portfolio}}$  can be. If the correlation coefficient were - 1, it would be possible to make  $\sigma_{\text{portfolio}}$  go to zero by picking the proper weightings of  $W_1$  and  $W_2$ .

(Study Session 12, Module 39.3, LOS 39.e)

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### Question #19 of 74

Assets A (with a variance of 0.25) and B (with a variance of 0.40) are perfectly positively correlated. If an investor creates a portfolio using only these two assets with 40% invested in A, the portfolio standard deviation is *closest* to:

A) 0.3742.



B) 0.3400.



C) 0.5795.



**Explanation**

The portfolio standard deviation =  $[(0.4)^2(0.25) + (0.6)^2(0.4) + 2(0.4)(0.6)(0.25)^{0.5}(0.4)^{0.5}]^{0.5} = 0.5795$

(Study Session 12, Module 39.3, LOS 39.e)

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**Question #20 of 74**

Adding a stock to a portfolio will reduce the risk of the portfolio if the correlation coefficient is *less* than which of the following?

A) +1.00.



B) +0.50.



C) 0.00.



**Explanation**

Adding any stock that is not perfectly correlated with the portfolio (+1) will reduce the risk of the portfolio.

(Study Session 12, Module 39.3, LOS 39.f)

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**Question #21 of 74**

A portfolio manager adds a new stock that has the same standard deviation of returns as the existing portfolio but has a correlation coefficient with the existing portfolio that is less than +1. Adding this stock will have what effect on the standard deviation of the revised portfolio's returns? The standard deviation will:

A) increase.



B) decrease.



C) decrease only if the correlation is negative.



**Explanation**

If the correlation coefficient is less than 1, there are benefits to diversification. Thus, adding the stock will reduce the portfolio's standard deviation.

(Study Session 12, Module 39.3, LOS 39.f)

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**Question #22 of 74**



If the standard deviation of returns for stock A is 0.60 and for stock B is 0.40 and the covariance between the returns of the two stocks is 0.009 what is the correlation between stocks A and B?

A) 0.0020.



B) 0.0375.



C) 26.6670.



#### Explanation

$\text{Cov}_{A,B} = (r_{A,B})(SD_A)(SD_B)$ , where  $r$  = correlation coefficient and  $SD_x$  = standard deviation of stock  $x$

Then,  $(r_{A,B}) = \text{Cov}_{A,B} / (SD_A \times SD_B) = 0.009 / (0.600 \times 0.400) = 0.0375$

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #23 of 74

Kendra Jackson, CFA, is given the following information on two stocks, Rockaway and Bridgeport.

- Covariance between the two stocks = 0.0325
- Standard Deviation of Rockaway's returns = 0.25
- Standard Deviation of Bridgeport's returns = 0.13

Assuming that Jackson must construct a portfolio using only these two stocks, which of the following combinations will result in the *minimum* variance portfolio?

A) 80% in Bridgeport, 20% in Rockaway.



B) 100% in Bridgeport.



C) 50% in Bridgeport, 50% in Rockaway.



#### Explanation

First, calculate the correlation coefficient to check whether diversification will provide any benefit.

$$r_{\text{Bridgeport, Rockaway}} = \text{COV}_{\text{Bridgeport, Rockaway}} / [(\sigma_{\text{Bridgeport}}) \times (\sigma_{\text{Rockaway}})] = 0.0325 / (0.13 \times 0.25) = 1.00$$

Since the stocks are perfectly positively correlated, there are no diversification benefits and we select the stock with the lowest risk (as measured by variance or standard deviation), which is Bridgeport.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #24 of 74

A bond analyst is looking at historical returns for two bonds, Bond 1 and Bond 2. Bond 2's returns are much more volatile than Bond 1. The variance of returns for Bond 1 is 0.012 and the variance of returns of Bond 2 is 0.308. The correlation between the returns of the two bonds is 0.79, and the covariance is 0.048. If the variance of Bond 1 increases to 0.026 while the variance of Bond 2 decreases to 0.188 and the covariance remains the same, the correlation between the two bonds will:

A) increase.



B) decrease.



C) remain the same.



**Explanation**

$P_{1,2} = 0.048 / (0.026^{0.5} \times 0.188^{0.5}) = 0.69$  which is lower than the original 0.79.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #25 of 74

On a graph of risk, measured by standard deviation and expected return, the *efficient frontier* represents:

A) the group of portfolios that have extreme values and therefore are "efficient" in their allocation.



B) all portfolios plotted in the northeast quadrant that maximize return.



C) the set of portfolios that dominate all others as to risk and return.



**Explanation**

The efficient set is the set of portfolios that dominate all other portfolios as to risk and return. That is, they have highest expected return at each level of risk.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #26 of 74

Two assets are perfectly positively correlated. If 30% of an investor's funds were put in the asset with a standard deviation of 0.3 and 70% were invested in an asset with a standard deviation of 0.4, what is the standard deviation of the portfolio?

A) 0.426.



B) 0.370.



C) 0.151.



**Explanation**

$\sigma_{\text{portfolio}} = [W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{1/2}$  given  $r_{1,2} = +1$

$\sigma = [W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + 2W_1W_2\sigma_1\sigma_2]^{1/2} = (W_1\sigma_1 + W_2\sigma_2)^2)^{1/2}$

$\sigma = (W_1\sigma_1 + W_2\sigma_2) = (0.3)(0.3) + (0.7)(0.4) = 0.09 + 0.28 = 0.37$

(Study Session 12, Module 39.3, LOS 39.e)

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### Question #27 of 74

Stock A has a standard deviation of 4.1% and Stock B has a standard deviation of 5.8%. If the stocks are perfectly positively correlated, which portfolio weights minimize the portfolio's standard deviation?

	<u>Stock A</u>	<u>Stock B</u>	
A)	63%	37%	✗
B)	100%	0%	✓
C)	0%	100%	✗

#### Explanation

Because there is a perfectly positive correlation, there is no benefit to diversification. Therefore, the investor should put all his money into Stock A (with the lowest standard deviation) to minimize the risk (standard deviation) of the portfolio.

(Study Session 12, Module 39.3, LOS 39.f)

### Question #28 of 74

An investor has a two-stock portfolio (Stocks A and B) with the following characteristics:

- $\sigma_A = 55\%$
- $\sigma_B = 85\%$
- $\text{Covariance}_{A,B} = 0.09$
- $W_A = 70\%$
- $W_B = 30\%$

The variance of the portfolio is *closest* to:

- A) 0.25. ✓
- B) 0.39. ✗
- C) 0.54. ✗

#### Explanation

The formula for the *variance* of a 2-stock portfolio is:

$$s^2 = [W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2W_A W_B \sigma_A \sigma_B r_{A,B}]$$

Since  $\sigma_A \sigma_B r_{A,B} = \text{Cov}_{A,B}$ , then

$$s^2 = [(0.7^2 \times 0.55^2) + (0.3^2 \times 0.85^2) + (2 \times 0.7 \times 0.3 \times 0.09)] = [0.1482 + 0.0650 + 0.0378] = 0.2511.$$

(Study Session 12, Module 39.3, LOS 39.e)

### Question #29 of 74

A measure of how well the returns of two risky assets move together is the:

- A) standard deviation. ✗

B) covariance.



C) range.



#### Explanation

This is a correct description of covariance. A positive covariance means the returns of the two securities move in the same direction. A negative covariance means that the returns of two securities move in opposite directions. A zero covariance means there is no relationship between the behaviors of two stocks. The magnitude of the covariance depends on the magnitude of the individual stock's standard deviations and the relationship between their co-movements. The covariance is an absolute measure of movement and is measured in return units squared.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #30 of 74

In a set of portfolios, the portfolio with the highest rate of return, but the same variance of the rate of return as the others, would be considered a(n):

A) efficient portfolio.



B) positive alpha portfolio.



C) positive beta portfolio.



#### Explanation

The efficient frontier, which represents the set of portfolios that provides the highest return at each level of risk, is comprised of efficient portfolios. The optimal portfolio for each investor is the point on the highest indifference curve that is tangent to the efficient frontier.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #31 of 74

Which of the following statements about portfolio diversification is *CORRECT*?

A) The efficient frontier represents individual securities.



B) As the correlation coefficient moves from +1 to zero, the potential for diversification diminishes.



C) When a risk-averse investor is confronted with two investment opportunities having the same expected return, the investor will take the opportunity with the lower risk.



#### Explanation

The other statements are false. The lower the correlation coefficient; the greater the potential for diversification. Efficient *portfolios* lie *on* the efficient frontier.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #32 of 74

An investor has identified the following possible portfolios. Which portfolio *cannot* be on the efficient frontier?

Portfolio	Expected Return	Standard Deviation
V	18%	35%
W	12%	16%
X	10%	10%
Y	14%	20%
Z	13%	24%

A) X.



B) Z.



C) Y.



#### Explanation

Portfolio Z must be inefficient because its risk is higher than Portfolio Y and its expected return is lower than Portfolio Y.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #33 of 74

What is the variance of a two-stock portfolio if 15% is invested in stock A (variance of 0.0071) and 85% in stock B (variance of 0.0008) and the correlation coefficient between the stocks is  $-0.04$ ?

A) 0.0026.



B) 0.0007.



C) 0.0020.



#### Explanation

The *variance* of the portfolio is found by:

$$[W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}], \text{ or } [(0.15)^2(0.0071) + (0.85)^2(0.0008) + (2)(0.15)(0.85)(0.0843)(0.0283)(-0.04)] = 0.0007.$$

(Study Session 12, Module 39.3, LOS 39.e)

### Question #34 of 74

If two stocks have positive covariance, which of the following statements is CORRECT?

A) If one stock doubles in price, the other will also double in price.



B) The rates of return tend to move in the same direction relative to their individual means.



C) The two stocks must be in the same industry.



#### Explanation

This is a correct description of positive covariance.

If one stock doubles in price, the other will also double in price is true if the *correlation coefficient* = 1. The two stocks need *not* be in the same industry.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #35 of 74

The basic premise of the risk-return trade-off suggests that risk-averse individuals purchasing investments with higher non-diversifiable risk should expect to earn:

A) lower rates of return.



B) higher rates of return.



C) rates of return equal to the market.



#### Explanation

Investors are *risk averse*. Given a choice between two assets with equal rates of return, the investor will always select the asset with the lowest level of risk. **This means that there is a positive relationship between expected returns (ER) and expected risk ( $E\sigma$ )** and the risk return line (capital market line [CML] and security market line [SML]) is upward sweeping.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #36 of 74

An investor with a buy-and-hold strategy who makes quarterly deposits into an account should *most appropriately* evaluate portfolio performance using the portfolio's:

A) geometric mean return.



B) money-weighted return.



C) arithmetic mean return.



#### Explanation

Geometric mean return (time-weighted return) is the most appropriate method for performance measurement as it does not consider additions to or withdrawals from the account.

(Study Session 12, Module 39.1, LOS 39.a)

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### Question #37 of 74

Betsy Minor is considering the diversification benefits of a two stock portfolio. The expected return of stock A is 14 percent with a standard deviation of 18 percent and the expected return of stock B is 18 percent with a standard deviation of 24 percent. Minor intends to invest 40 percent of her money in stock A, and 60 percent in stock B. The correlation coefficient between the two stocks is 0.6. What is the variance and standard deviation of the two stock portfolio?

A) Variance = 0.04666; Standard Deviation = 21.60%.



**B)** Variance = 0.02206; Standard Deviation = 14.85%. 

**C)** Variance = 0.03836; Standard Deviation = 19.59%. 

**Explanation**

$$(0.40)^2(0.18)^2 + (0.60)^2(0.24)^2 + 2(0.4)(0.6)(0.18)(0.24)(0.6) = 0.03836.$$


$$0.03836^{0.5} = 0.1959 \text{ or } 19.59\%.$$


(Study Session 12, Module 39.3, LOS 39.e)


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### Question #38 of 74

Which of the following statements regarding the covariance of rates of return is *least* accurate?

**A)** If the covariance is negative, the rates of return on two investments will always move in different directions relative to their means. 

**B)** Covariance is positive if two variables tend to both be above their mean values in the same time periods. 

**C)** Covariance is not a very useful measure of the strength of the relationship between rates of return. 

**Explanation**


Negative covariance means rates of return for one security will tend to be above its mean return in periods when the other is below its mean return, and vice versa. Positive covariance means that returns on both securities will tend to be above (or below) their mean returns in the same time periods. For the returns to *always* move in opposite directions, they would have to be perfectly negatively correlated. Negative covariance by itself does not imply anything about the strength of the negative correlation, it must be standardized by dividing by the product of the securities' standard deviations of return.


(Study Session 12, Module 39.2, LOS 39.c)

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### Question #39 of 74

Which of the following statements *best* describes risk aversion?

**A)** Given a choice between two assets of equal return, the investor will choose the asset with the least risk. 

**B)** The investor will always choose the asset with the least risk. 

**C)** There is an indirect relationship between expected returns and expected risk. 

**Explanation**

Risk aversion is best defined as: given a choice between two assets of equal return, the investor will choose the asset with the least risk. The investor will not always choose the asset with the least risk or the asset with the least risk and least return. As well, there is a positive, not indirect, relationship between risk and return.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #40 of 74

An analyst gathered the following data for Stock A and Stock B:

Time Period	Stock A Returns	Stock B Returns
1	10%	15%
2	6%	9%
3	8%	12%

What is the covariance for this portfolio?

A) 3.



B) 12.



C) 6.



#### Explanation

The formula for the covariance for historical data is:

$$\text{cov}_{1,2} = \{\Sigma[(R_{\text{stock A}} - \text{Mean } R_A)(R_{\text{stock B}} - \text{Mean } R_B)]\} / (n - 1)$$

$$\text{Mean } R_A = (10 + 6 + 8) / 3 = 8, \text{Mean } R_B = (15 + 9 + 12) / 3 = 12$$

$$\text{Here, } \text{cov}_{1,2} = [(10 - 8)(15 - 12) + (6 - 8)(9 - 12) + (8 - 8)(12 - 12)] / 2 = 6$$

(Study Session 12, Module 39.2, LOS 39.c)

### Question #41 of 74

There are benefits to diversification as long as:

A) the correlation coefficient between the assets is less than 1.



B) there is perfect positive correlation between the assets.



C) there must be perfect negative correlation between the assets.



#### Explanation

There are benefits to diversification as long as the correlation coefficient between the assets is less than 1.

(Study Session 12, Module 39.3, LOS 39.f)

### Question #42 of 74

Which of the following statements about the efficient frontier is *least* accurate?

A) Portfolios falling on the efficient frontier are fully diversified.



B) Investors will want to invest in the portfolio on the efficient frontier that offers the highest rate of return.



C) The efficient frontier shows the relationship that exists between expected return and total risk in the absence of a risk-free asset.





### Explanation

The optimal portfolio for each investor is the *highest indifference curve that is tangent to the efficient frontier*.

(Study Session 12, Module 39.3, LOS 39.h)

### Question #43 of 74

An asset manager's portfolio had the following annual rates of return:

Year	Return
20X7	+6%
20X8	-37%
20X9	+27%

The manager states that the return for the period is -5.34%. The manager has reported the:

- A) geometric mean return.
- B) arithmetic mean return.
- C) holding period return.



### Explanation

Geometric Mean Return =  $\sqrt[3]{(1 + 0.06)(1 - 0.37)(1 + 0.27)} - 1 = -5.34\%$

Holding period return =  $(1 + 0.06)(1 - 0.37)(1 + 0.27) - 1 = -15.2\%$

Arithmetic mean return =  $(6\% - 37\% + 27\%) / 3 = -1.33\%$ .

(Study Session 12, Module 39.1, LOS 39.a)

### Question #44 of 74

An investor is evaluating the following possible portfolios. Which of the following portfolios would *least likely* lie on the efficient frontier?

Portfolio	Expected Return	Standard Deviation
A	26%	28%
B	23%	34%
C	14%	23%
D	18%	14%
E	11%	8%
F	18%	16%

- A) B, C, and F.
- B) A, B, and C.
- C) C, D, and E.



### Explanation




Portfolio B cannot lie on the frontier because its risk is higher than that of Portfolio A's with lower return. Portfolio C cannot lie on the frontier because it has higher risk than Portfolio D with lower return. Portfolio F cannot lie on the frontier because its risk is higher than Portfolio D.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #45 of 74

Which one of the following statements about correlation is NOT correct?

- A) If the correlation coefficient were -1, a zero variance portfolio could be constructed. 
- B) Potential benefits from diversification arise when correlation is less than +1. 
- C) If the correlation coefficient were 0, a zero variance portfolio could be constructed. 

### Explanation




A correlation coefficient of zero means that there is no relationship between the stock's returns. The other statements are true.

(Study Session 12, Module 39.3, LOS 39.f)

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### Question #46 of 74

An investor begins with a \$100,000 portfolio. At the end of the first period, it generates \$5,000 of income, which he does not reinvest. At the end of the second period, he contributes \$25,000 to the portfolio. At the end of the third period, the portfolio is valued at \$123,000. The portfolio's money-weighted return per period is *closest to*:

- A) 1.20%. 
- B) -0.50%. 
- C) 0.94%. 

### Explanation

Using the financial calculator, the initial investment (CF<sub>0</sub>) is -100,000. The income is +5,000 (CF<sub>1</sub>), and the contribution is -25,000 (CF<sub>2</sub>). Finally, the ending value is +123,000 (CF<sub>3</sub>) available to the investor. Compute IRR = 0.94

(Study Session 12, Module 39.1, LOS 39.a)

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### Question #47 of 74

The correlation coefficient between stocks A and B is 0.75. The standard deviation of stock A's returns is 16% and the standard deviation of stock B's returns is 22%. What is the covariance between stock A and B?

- A) 0.3750. 
- B) 0.0352. 

C) 0.0264.



**Explanation**

$\text{cov}_{1,2} = 0.75 \times 0.16 \times 0.22 = 0.0264 = \text{covariance between A and B.}$

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #48 of 74

Over the long term, the annual returns and standard deviations of returns for major asset classes have shown:

A) a negative relationship.



B) a positive relationship.



C) no clear relationship.



**Explanation**

In most markets and for most asset classes, higher average returns have historically been associated with higher risk (standard deviation of returns).

(Study Session 12, Module 39.1, LOS 39.b)

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### Question #49 of 74

According to Markowitz, an investor's optimal portfolio is determined where the:

A) investor's highest utility curve is tangent to the efficient frontier.



B) investor's utility curve meets the efficient frontier.



C) investor's lowest utility curve is tangent to the efficient frontier.



**Explanation**

The optimal portfolio for an investor is determined as the point where the investor's highest utility curve is tangent to the efficient frontier.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #50 of 74

A security portfolio earns a gross return of 7.0% and a net return of 6.5%. The difference of 0.5% *most likely* results from:

A) inflation.



B) taxes.



C) fees.



**Explanation**

The net return on a portfolio is its gross return minus management and administrative fees. A return adjusted for taxes is called an after-tax return. A return adjusted for inflation is called a real return.

(Study Session 12, Module 39.1, LOS 39.a)

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### Question #51 of 74

A line that represents the possible portfolios that combine a risky asset and a risk free asset is *most accurately* described as a:

A) capital allocation line.



B) characteristic line.



C) capital market line.



#### Explanation

The line that represents possible combinations of a risky asset and the risk-free asset is referred to as a capital allocation line (CAL). The capital market line (CML) represents possible combinations of the market portfolio with the risk-free asset. A characteristic line is the best fitting linear relationship between excess returns on an asset and excess returns on the market and is used to estimate an asset's beta.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #52 of 74

Investors who are *less* risk averse will have what type of indifference curves for risk and expected return?

A) Inverted.



B) Flatter.



C) Steeper.



#### Explanation

Investors who are less risk averse will have flatter indifference curves, meaning they are willing to take on more risk for a slightly higher return. Investors who are more risk averse require a much higher return to accept more risk, producing steeper indifference curves.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #53 of 74

If the standard deviation of asset A is 12.2%, the standard deviation of asset B is 8.9%, and the correlation coefficient is 0.20, what is the covariance between A and B?

A) 0.0001.



B) 0.0022.



C) 0.0031.



#### Explanation

The formula is:  $(\text{correlation})(\text{standard deviation of A})(\text{standard deviation of B}) = (0.20)(0.122)(0.089) = 0.0022$ .

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #54 of 74

The *most appropriate* measure of the increase in the purchasing power of a portfolio's value over a given span of time is a(n):

A) real return.



B) holding period return.



C) after-tax return.



#### Explanation

A real return is adjusted for the effects of inflation and is used to measure the increase in purchasing power over time.

(Study Session 12, Module 39.1, LOS 39.a)

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### Question #55 of 74

If the standard deviation of stock A is 10.6%, the standard deviation of stock B is 14.6%, and the covariance between the two is 0.015476, what is the correlation coefficient?

A) 0.0002.



B) 0.



C) +1.



#### Explanation

The formula is:  $(\text{Covariance of A and B}) / [(\text{Standard deviation of A})(\text{Standard Deviation of B})] = (\text{Correlation Coefficient of A and B}) = (0.015476) / [(0.106)(0.146)] = 1$ .

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #56 of 74

An investment manager is looking at ten possible stocks to include in a client's portfolio. In order to achieve the maximum efficiency of the portfolio, the manager must:

A) include only the stocks that have the lowest volatility at a given expected rate of return.



B) include all ten stocks in the portfolio in equal amounts.



C) find the combination of stocks that produces a portfolio with the maximum expected rate of return at a given level of risk.



#### Explanation

The most efficient portfolio will be the one that lies on the efficient frontier. It will offer the highest expected return at a given level of risk compared to all other possible portfolios.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #57 of 74

Which one of the following portfolios does not lie on the efficient frontier?

Portfolio	Expected Return	Standard Deviation
A	7	5
B	9	12
C	11	10
D	15	15

A) C.

B) A.

C) B.



#### Explanation

Portfolio B has a lower expected return than Portfolio C with a *higher* standard deviation.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #58 of 74

Which of the following measures is NOT considered when calculating the risk (variance) of a two-asset portfolio?

A) Each asset's standard deviation.

B) Each asset weight in the portfolio.

C) The beta of each asset.



#### Explanation

The formula for calculating the variance of a two-asset portfolio is:

$$\sigma_p^2 = W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2W_A W_B \text{Cov}(a,b)$$

(Study Session 12, Module 39.3, LOS 39.e)

### Question #59 of 74

If the standard deviation of returns for stock A is 0.40 and for stock B is 0.30 and the covariance between the returns of the two stocks is 0.007 what is the correlation between stocks A and B?

A) 0.05830.



B) 17.14300.



C) 0.00084.



#### Explanation

$\text{Cov}_{A,B} = (r_{A,B})(SD_A)(SD_B)$ , where  $r$  = correlation coefficient and  $SD_x$  = standard deviation of stock  $x$

Then,  $(r_{A,B}) = \text{Cov}_{A,B} / (SD_A \times SD_B) = 0.007 / (0.400 \times 0.300) = 0.0583$

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #60 of 74

Which of the following statements about the efficient frontier is NOT correct?

A) The efficient frontier line bends backwards due to less than perfect correlation between assets.



B) A portfolio to the left of the efficient frontier is not attainable, while a portfolio to the right of the efficient frontier is inefficient.



C) The slope of the efficient frontier increases steadily as one moves up the curve.



#### Explanation

This statement should read, "The slope of the efficient frontier *decreases* steadily as one moves up the curve." The other statements are true.

(Study Session 12, Module 39.3, LOS 39.g)

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### Question #61 of 74

A stock has an expected return of 4% with a standard deviation of returns of 6%. A bond has an expected return of 4% with a standard deviation of 7%. An investor who prefers to invest in the stock rather than the bond is *best* described as:

A) risk seeking.



B) risk neutral.



C) risk averse.



#### Explanation

Given two investments with the same expected return, a risk averse investor will prefer the investment with less risk. A risk neutral investor will be indifferent between the two investments. A risk seeking investor will prefer the investment with more risk.

(Study Session 12, Module 39.2, LOS 39.d)

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### Question #62 of 74

An analyst observes the following return behavior between stocks X and Y.

Time Period	X's Return	Y's Return
1	7	5
2	9	8
3	10	11
4	10	8

What is the covariance of returns between stocks X and Y?

A) +3.0.



B) +1.5.



C) -3.0.



**Explanation**

Covariance =  $\{\Sigma[(\text{Return}_X - \text{Mean}_X)(\text{Return}_Y - \text{Mean}_Y)]\} / (n - 1)$

$\text{Mean}_X = (7 + 9 + 10 + 10) / 4 = 9$ ;  $\text{Mean}_Y = (5 + 8 + 11 + 8) / 4 = 8$

$\text{Cov}_{X,Y} = [(7 - 9)(5 - 8) + (9 - 9)(8 - 8) + (10 - 9)(11 - 8) + (10 - 9)(8 - 8)] / (4 - 1) = 3.0$

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #63 of 74

The covariance of the market's returns with the stock's returns is 0.008. The standard deviation of the market's returns is 0.1 and the standard deviation of the stock's returns is 0.2. What is the correlation coefficient between the stock and market returns?

A) 0.40.



B) 0.91.



C) 0.00016.



**Explanation**

$\text{Cov}_{A,B} = (r_{A,B})(SD_A)(SD_B)$ , where  $r$  = correlation coefficient and  $SD_X$  = standard deviation of stock  $x$

Then,  $(r_{A,B}) = \text{Cov}_{A,B} / (SD_A \times SD_B) = 0.008 / (0.100 \times 0.200) = 0.40$

*Remember:* The correlation coefficient must be between -1 and 1.

(Study Session 12, Module 39.2, LOS 39.c)

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### Question #64 of 74

As the correlation between the returns of two assets becomes lower, the risk reduction potential becomes:

A) greater.



B) smaller.





C) decreased by the same level.



#### Explanation

Perfect positive correlation ( $r = +1$ ) of the returns of two assets offers no risk reduction, whereas perfect negative correlation ( $r = -1$ ) offers the greatest risk reduction.

(Study Session 12, Module 39.3, LOS 39.f)

### Question #65 of 74

Stock A has a standard deviation of 10%. Stock B has a standard deviation of 15%. The covariance between A and B is 0.0105. The correlation between A and B is:

A) 0.70.



B) 0.55.



C) 0.25.



#### Explanation

$\text{Cov}_{A,B} = (r_{A,B})(SD_A)(SD_B)$ , where  $r$  = correlation coefficient and  $SD_x$  = standard deviation of stock  $x$

Then,  $(r_{A,B}) = \text{Cov}_{A,B} / (SD_A \times SD_B) = 0.0105 / (0.10 \times 0.15) = 0.700$

(Study Session 12, Module 39.2, LOS 39.c)

### Question #66 of 74

Which of the following portfolios falls below the Markowitz efficient frontier?

Portfolio	Expected Return	Expected Standard Deviation
A	12.1%	8.5%
B	14.2%	8.7%
C	15.1%	8.7%

A) Portfolio C.



B) Portfolio B.



C) Portfolio A.



#### Explanation

Portfolio B is inefficient (falls below the efficient frontier) because for the same risk level (8.7%), you could have portfolio C with a higher expected return (15.1% versus 14.2%).

(Study Session 12, Module 39.3, LOS 39.g)

### Question #67 of 74

Based on historical data for the United States, compared to long-term bonds, equities have tended to exhibit:

A) lower average annual returns and higher standard deviation of returns.



B) higher average annual returns and higher standard deviation of returns.



C) higher average annual returns and lower standard deviation of returns.



#### Explanation

Based on data for securities in the United States from 1926 to 2008, both small-cap stocks and large-cap stocks have exhibited higher average annual returns and higher standard deviations of returns than long-term corporate bonds and long-term government bonds.

(Study Session 12, Module 39.1, LOS 39.b)

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### Question #68 of 74

A portfolio currently holds Randy Co. and the portfolio manager is thinking of adding either XYZ Co. or Branton Co. to the portfolio. All three stocks offer the same expected return and total risk. The covariance of returns between Randy Co. and XYZ is +0.5 and the covariance between Randy Co. and Branton Co. is -0.5. The portfolio's risk would decrease:

A) most if she put half your money in XYZ Co. and half in Branton Co.



B) more if she bought XYZ Co.



C) more if she bought Branton Co.



#### Explanation

In portfolio composition questions, return and standard deviation are the key variables. Here you are told that both returns and standard deviations are equal. Thus, you just want to pick the companies with the lowest covariance, because that would mean you picked the ones with the lowest correlation coefficient.

$\sigma_{\text{portfolio}} = [W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2W_1 W_2 \sigma_1 \sigma_2 r_{1,2}]^{1/2}$  where  $\sigma_{\text{Randy}} = \sigma_{\text{Branton}} = \sigma_{\text{XYZ}}$  so you want to pick the lowest covariance which is between Randy and Branton.

(Study Session 12, Module 39.3, LOS 39.f)

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### Question #69 of 74

An investor calculates the following statistics on her two-stock (A and B) portfolio.

- $\sigma_A = 20\%$
- $\sigma_B = 15\%$
- $r_{A,B} = 0.32$
- $W_A = 70\%$
- $W_B = 30\%$

The portfolio's standard deviation is *closest* to:

A) 0.1832.



B) 0.1600.



C) 0.0256.



### Explanation

The formula for the standard deviation of a 2-stock portfolio is:

$$\sigma = [W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2W_AW_B\sigma_A\sigma_B\rho_{A,B}]^{1/2}$$

$$\sigma = [(0.7^2 \times 0.2^2) + (0.3^2 \times 0.15^2) + (2 \times 0.7 \times 0.3 \times 0.2 \times 0.15 \times 0.32)]^{1/2} = [0.0196 + 0.002025 + 0.004032]^{1/2} = 0.0256570^{1/2} = 0.1602, \text{ or approximately } \mathbf{16.0\%}.$$

(Study Session 12, Module 39.3, LOS 39.e)

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### Question #70 of 74

The particular portfolio on the efficient frontier that best suits an individual investor is determined by:

A) the individual's asset allocation plan.



B) the current market risk-free rate as compared to the current market return rate.



C) the individual's utility curve.



### Explanation

The *optimal portfolio* for each investor is the highest indifference curve that is tangent to the efficient frontier. The optimal portfolio is the portfolio that gives the investor the greatest possible utility.

(Study Session 12, Module 39.3, LOS 39.h)

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### Question #71 of 74

Which one of the following statements about correlation is NOT correct?

A) If two assets have perfect negative correlation, it is impossible to reduce the portfolio's overall variance.



B) The covariance is equal to the correlation coefficient times the standard deviation of one stock times the standard deviation of the other stock.



C) Positive covariance means that asset returns move together.



### Explanation

This statement should read, "If two assets have perfect negative correlation, it is possible to reduce the portfolio's overall variance *to zero*."

(Study Session 12, Module 39.3, LOS 39.f)

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### Question #72 of 74

The standard deviation of the rates of return is 0.25 for Stock J and 0.30 for Stock K. The covariance between the returns of J and K is 0.025. The correlation of the rates of return between J and K is:

A) 0.20.



B) 0.10.



C) 0.33.



#### Explanation

$\text{Cov}_{J,K} = (r_{J,K})(SD_J)(SD_K)$ , where  $r$  = correlation coefficient and  $SD_x$  = standard deviation of stock  $x$

Then,  $(r_{J,K}) = \text{Cov}_{J,K} / (SD_J \times SD_K) = 0.025 / (0.25 \times 0.30) = 0.333$

(Study Session 12, Module 39.2, LOS 39.c)

### Question #73 of 74

Which of the following statements concerning the efficient frontier is *most* accurate? It is the:

A) set of portfolios that gives investors the lowest risk.



B) set of portfolios that gives investors the highest return.



C) set of portfolios where there are no more diversification benefits.



#### Explanation

The efficient frontier outlines the set of portfolios that gives investors the highest return for a given level of risk or the lowest risk for a given level of return. It is also the point at which there are no more benefits to diversification.

(Study Session 12, Module 39.3, LOS 39.g)

### Question #74 of 74

Gregg Goebel and Mason Erikson are studying for the Level I CFA examination. They have just started the section on Portfolio Management and Erikson is having difficulty with the equations for the covariance ( $\text{cov}_{1,2}$ ) and the correlation coefficient ( $r_{1,2}$ ) for two-stock portfolios. Goebel is confident with the material and creates the following quiz for Erikson. Using the information in the table below, he asks Erickson to fill in the question marks.

	Portfolio J	Portfolio K	Portfolio L
Number of Stocks	2	2	2
Covariance	?	$\text{cov}_{1,2} = 0.020$	$\text{cov}_{1,2} = 0.003$
Correlation coefficient	$r_{1,2} = 0.750$	?	?
Risk measure Stock 1	Std. Deviation <sub>1</sub> = 0.08	Std. Deviation <sub>1</sub> = 0.20	Std. Deviation <sub>1</sub> = 0.18
Risk measure Stock 2	Std. Deviation <sub>2</sub> = 0.18	Std. Deviation <sub>2</sub> = 0.12	Variance <sub>2</sub> = 0.09

Which of the following choices correctly gives the covariance for Portfolio J and the correlation coefficients for Portfolios K and L?

Portfolio J      Portfolio K      Portfolio L

A)	0.011	0.002	0.076	
B)	1.680	0.002	0.076	
C)	0.011	0.833	0.056	

#### Explanation

The calculations are as follows:

*Portfolio J covariance* =  $\text{cov}_{1,2} = (r_{1,2}) \times (s_1) \times (s_2) = 0.75 \times 0.08 \times 0.18 = 0.0108$ , or 0.011.

*Portfolio K correlation coefficient* =  $(r_{1,2}) = \text{cov}_{1,2} / [(s_1) \times (s_2)] = 0.02 / (0.20 \times 0.12) = 0.833$ .

*Portfolio L correlation coefficient* =  $(r_{1,2}) = \text{cov}_{1,2} / [(s_1) \times (s_2)^{1/2}] = 0.003 / (0.18 \times 0.09^{1/2}) = 0.003 / (0.18 \times 0.30) = 0.056$ .

(Study Session 12, Module 39.2, LOS 39.c)