Question #1 of 31

Question ID: 1572811

For two random variables, P(X = 20, Y = 0) = 0.4, and P(X = 30, Y = 50) = 0.6. Given that E(X) is 26 and E(Y) is 30, the covariance of X and Y is:

A) 120.00.

B) 125.00.

C) 25.00.

Explanation

The covariance is COV(XY) = (0.4 × ((20 – 26) × (0 – 30))) + ((0.6 × (30 – 26) × (50 – 30))) = 120.

(Module 5.1, LOS 5.b)

Question #2 of 31

Question ID: 1572807

Personal Advisers, Inc., has determined four possible economic scenarios and has projected the portfolio returns for two portfolios for their client under each scenario. Personal's economist has estimated the probability of each scenario as shown in the table below. Given this information, what is the covariance of the returns on Portfolio A and Portfolio B?

Scenario	Probability	Return on Portfolio A	Return on Portfolio B
A	15%	18%	19%
B	20%	17%	18%
C	25%	11%	10%
D	40%	7%	9%

A) 0.002019.

B) 0.890223.

C) 0.001898.

Explanation

S	P (S)	Return on Portfolio A	R_A – $E(R_A)$	Return on Portfolio B	R_B – $E(R_B)$	$[R_A – E(R_A)] \times [R_B – E(R_B)] \times P(S)$
A	15%	18%	6.35%	19%	6.45%	0.000614
B	20%	17%	5.35%	18%	5.45%	0.000583
C	25%	11%	–0.65%	10%	–2.55%	0.000041
D	40%	7%	–4.65%	9%	–3.55%	0.000660
		$E(R_A)$ = 11.65%		$E(R_B)$ = 12.55%		$Cov(R_A,R_B)$ = 0.001898

(Module 5.1, LOS 5.b)

Question #3 of 31

Question ID: 1572804

The following table shows the weightings and expected returns for a portfolio of three stocks:

Stock	Weight	$E(R_X)$
V	0.40	12%
M	0.35	8%
S	0.25	5%

What is the expected return of this portfolio?

A) 9.05%.

B) 8.85%.

C) 8.33%.

Explanation

The expected return is simply a weighted average return.

Multiplying the weight of each asset by its expected return, then summing, produces: E(RP) = 0.40(12) + 0.35(8) + 0.25(5) = 8.85%.

State of the Economy	Weight	$E(R_X)$	Probability × Return
V	0.40	12%	0.4 × 12%
M	0.35	8%	0.35 × 8%
S	0.25	5%	0.25 × 5%
Expected Return = ∑ Weight × $E(R_X)$			**8.85%**

(Module 5.1, LOS 5.a)

Question #4 of 31

Question ID: 1572801

For assets A and B we know the following: $E(R_A) = 0.10$, $E(R_B) = 0.10$, $Var(R_A) = 0.18$, $Var(R_B) = 0.36$ and the correlation of the returns is 0.6. What is the variance of the return of a portfolio that is equally invested in the two assets?

A) 0.1102.

B) 0.1500.

C) 0.2114.

Explanation

You are not given the covariance in this problem but instead you are given the correlation coefficient and the variances of assets A and B from which you can determine the covariance by Covariance = (correlation of A, B) × Standard Deviation of A) × (Standard Deviation of B).

Since it is an equally weighted portfolio, the solution is:

$$[(0.5^2) \times 0.18] + [(0.5^2) \times 0.36] + [2 \times 0.5 \times 0.5 \times 0.6 \times (0.18^{0.5}) \times (0.36^{0.5})] = 0.045 + 0.09 + 0.0764 = 0.2114$$

(Module 5.1, LOS 5.a)

Question #5 of 31

Question ID: 1572809

The joint probability function for returns on an equity index (RI) and returns on a stock (RS)is given in the following table:

	Returns on Index (R_I)		
Return on stock (R_S)	**R_I = 0.16**	**R_I = 0.02**	**R_I = −0.10**
R_S = 0.24	0.25	0.00	0.00
R_S = 0.03	0.00	0.45	0.00
R_S = −0.15	0.00	0.00	0.30

Covariance between stock returns and index returns is *closest* to:

A) 0.019.

B) 0.014.

C) 0.029.

Explanation

E(I) = (0.25 × 0.16) + (0.45 × 0.02) + (0.30 × –0.10) = 0.0190.

E(S) = (0.25 × 0.24) + (0.45 × 0.03) + (0.30 × –0.15) = 0.0285.

Covariance = [0.25 × (0.16 – 0.0190) × (0.24 – 0.0285)] + [0.45 × (0.02 – 0.0190) × (0.03 – 0.0285)] + [0.30 × (–0.10 – 0.0190) × (–0.15 – 0.0285)] = 0.0138.

(Module 5.1, LOS 5.b)

Question #6 of 31

Question ID: 1572805

If Stock X has a standard deviation of returns of 18.9% and Stock Y has a standard deviation of returns equal to 14.73% and returns on the stocks are perfectly positively correlated, the standard deviation of an equally weighted portfolio of the two is:

A) 14.67%.

B) 16.82%.

C) 10.25%.

Explanation

The standard deviation of two stocks that are perfectly positively correlated is the weighted average of the standard deviations: 0.5(18.9) + 0.5(14.73) = 16.82%. This relationship is true only when the correlation is one. Otherwise, you must use the formula:

$$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2\rho_{1,2}}$$

(Module 5.1, LOS 5.a)

Question #7 of 31

Question ID: 1572798

Given P(X = 2) = 0.3, P(X = 3) = 0.4, P(X = 4) = 0.3. What is the variance of X?

A) 0.3.

B) 0.6.

C) 3.0.

Explanation

The variance is the sum of the squared deviations from the expected value weighted by the probability of each outcome.

The expected value is E(X) = 0.3 × 2 + 0.4 × 3 + 0.3 × 4 = 3.

The variance is 0.3 × $(2 - 3)^2$ + 0.4 × $(3 - 3)^2$ + 0.3 × $(4 - 3)^2$ = 0.6.

(Module 5.1, LOS 5.a)

Question #8 of 31

Question ID: 1572802

Use the following probability distribution.

State of the Economy	Probability	Return on Portfolio
Boom	0.30	15%
Bust	0.70	3%

The expected return for the portfolio is:

A) 9.0%.

B) 6.6%.

C) 8.1%.

Explanation

The expected portfolio return is a probability-weighted average:

State of the Economy	Probability	Return on Portfolio	Probability × Return
Boom	0.30	15%	0.3 × 15% = 4.5%
Bust	0.70	3%	0.7 × 3% = 2.1%
Expected Return = ∑Probability × Return			**6.6%**

(Module 5.1, LOS 5.a)

Question #9 of 31

Question ID: 1572812

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 Y.

B) Portfolio X.

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.

(Module 5.1, LOS 5.c)

Question #10 of 31

Question ID: 1572796

For assets A and B we know the following: $E(R_A) = 0.10$, $E(R_B) = 0.20$, $Var(R_A) = 0.25$, $Var(R_B) = 0.36$ and the correlation of the returns is 0.6. What is the expected return of a portfolio that is equally invested in the two assets?

A) 0.3050.

B) 0.1500.

C) 0.2275.

Explanation

The expected return of a portfolio composed of n-assets is the weighted average of the expected returns of the assets in the portfolio: $((w_1) \times (E(R_1)) + ((w_2) \times (E(R_2)) = (0.5 \times 0.1) + (0.5 \times 0.2) = 0.15$.

(Module 5.1, LOS 5.a)

Question #11 of 31

Question ID: 1572806

Given the following probability distribution, find the covariance of the expected returns for stocks A and B.

Event	$P(R_i)$	R_A	R_B
Recession	0.10	-5%	4%
Below Average	0.30	-2%	8%
Normal	0.50	10%	10%
Boom	0.10	31%	12%

A) 17.4.

B) 10.9

C) 3.2.

Explanation

Find the weighted average return for each stock.

Stock A: (0.10)(-5) + (0.30)(-2) + (0.50)(10) + (0.10)(31) = 7%.

Stock B: (0.10)(4) + (0.30)(8) + (0.50)(10) + (0.10)(12) = 9%.

Next, multiply the differences of the two stocks by each other, multiply by the probability of the event occurring, and sum. This is the covariance between the returns of the two stocks.

$$[(-5 - 7) \times (4 - 9)]\,(0.1) + [(-2 - 7) \times (8 - 9)](0.3) + [(10 - 7) \times (10 - 9)](0.5) + [(31 - 7) \times (12 - 9)](0.1) = 6.0 + 2.7 + 1.5 + 7.2 = 17.4$$

(Module 5.1, LOS 5.b)

Question #12 of 31

Question ID: 1572795

The following information is available concerning expected return and standard deviation of Pluto and Neptune Corporations:

	Expected Return	Standard Deviation
Pluto Corporation	11%	0.22
Neptune Corporation	9%	0.13

If the correlation between Pluto and Neptune is 0.25, determine the expected return and standard deviation of a portfolio that consists of 65% Pluto Corporation stock and 35% Neptune Corporation stock.

A) 10.3% expected return and 2.58% standard deviation.

B) 10.3% expected return and 16.05% standard deviation.

C) 10.0% expected return and 16.05% standard deviation.

Explanation

$$ER_{Port} = (W_{Pluto})(ER_{Pluto}) + (W_{Neptune})(ER_{Neptune})$$

$$= (0.65)(0.11) + (0.35)(0.09) = 10.3\%$$

$$\sigma_p = [(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2w_1w_2\sigma_1\sigma_2\, r_{1,2}]^{1/2}$$

$$= [(0.65)^2(22)^2 + (0.35)^2(13)^2 + 2(0.65)(0.35)(22)(13)(0.25)]^{1/2}$$

$$= [(0.4225)(484) + (0.1225)(169) + 2(0.65)(0.35)(22)(13)(0.25)]^{1/2}$$

$$= (257.725)^{1/2} = 16.0538\%$$

(Module 5.1, LOS 5.a)

Question #13 of 31

Question ID: 1572794

Assume two stocks are perfectly negatively correlated. Stock A has a standard deviation of 10.2% and stock B has a standard deviation of 13.9%. What is the standard deviation of the portfolio if 75% is invested in A and 25% in B?

A) 0.00%.

B) 0.17%.

C) 4.18%.

Explanation

The standard deviation of the portfolio is found by:

$[W_1^2\ \sigma_1^2 + W_2^2\ \sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{0.5}$, or $[(0.75)^2(0.102)^2 + (0.25)^2(0.139)^2 + (2)(0.75)(0.25)(0.102)(0.139)(-1.0)]^{0.5} = 0.0418$, or 4.18%.

(Module 5.1, LOS 5.a)

Question #14 of 31

Question ID: 1572815

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 X.

C) Portfolio Y.

Explanation

According to the safety-first criterion, the optimal portfolio is the one that 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.

(Module 5.1, LOS 5.c)

Question #15 of 31

Question ID: 1572792

An investor has two stocks, Stock R and Stock S in her portfolio. Given the following information on the two stocks, the portfolio's standard deviation is *closest* to:

- σ_R = 34%
- σ_S = 16%
- $r_{R,S}$ = 0.67
- W_R = 80%
- W_S = 20%

A) 29.4%.

B) 7.8%.

C) 8.7%.

Explanation

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

$$s = [W_A{}^2 s_A{}^2 + W_B{}^2 s_B{}^2 + 2W_A W_B s_A s_B r_{A,B}]^{1/2}$$

$s = [(0.8^2 \times 0.34^2) + (0.2^2 \times 0.16^2) + (2 \times 0.8 \times 0.2 \times 0.34 \times 0.16 \times 0.67)]^{1/2}$ = $[0.073984 + 0.001024 + 0.0116634]^{1/2} = 0.0866714^{1/2}$ = 0.2944, or approximately **29.4%.**

(Module 5.1, LOS 5.a)

Question #16 of 31

Question ID: 1572810

For two random variables, P(X = 2, Y = 10) = 0.3, P(X = 6, Y = 2.5) = 0.4, and P(X = 10, Y = 0) = 0.3. Given that E(X) is 6 and E(Y) is 4, the covariance of X and Y is:

A) -12.0.

B) 24.0.

C) 6.0.

Explanation

The covariance is COV(XY) = ((0.3 × ((2 – 6) × (10 – 4))) + ((0.4 × ((6 – 6) × (2.5 – 4))) + (0.3 × ((10 – 6) × (0 – 4))) = –12.

(Module 5.1, LOS 5.b)

Question #17 of 31

Question ID: 1572817

An investor is considering investing in one of the following three portfolios:

Statistical Measures	Portfolio X	Portfolio Y	Portfolio Z
Expected annual return	12%	17%	22%
Standard deviation of return	14%	20%	25%

If the investor's minimum acceptable return is 5%, the optimal portfolio using Roy's safety-first criterion is:

A) Portfolio X.

B) Portfolio Y.

C) Portfolio Z.

Explanation

$$\begin{aligned}
\text{Portfolio X: SFRatio} &= \frac{12-5}{14} = 0.50 \\
\text{Portfolio Y: SFRatio} &= \frac{17-5}{20} = 0.60 \\
\text{Portfolio Z: SFRatio} &= \frac{22-5}{25} = 0.68
\end{aligned}$$

According to the safety-first criterion, Portfolio Z, with the largest ratio (0.68), is the best alternative. (Module 5.1, LOS 5.c)

Question #18 of 31

Question ID: 1572803

Use the following probability distribution to calculate the standard deviation for the portfolio.

State of the Economy	Probability	Return on Portfolio
Boom	0.30	15%
Bust	0.70	3%

A) 5.5%.

B) 6.0%.

C) 6.5%.

Explanation

$$[0.30 \times (0.15 - 0.066)^2 + 0.70 \times (0.03 - 0.066)^2]^{1/2} = 5.5\%.$$

(Module 5.1, LOS 5.a)

Question #19 of 31

Question ID: 1572799

Given the following probability distribution, find the standard deviation of expected returns.

Event	$P(R_A)$	R_A
Recession	0.10	-5%
Below Average	0.30	-2%
Normal	0.50	10%
Boom	0.10	31%

A) 10.04%.

B) 12.45%.

C) 7.00%.

Explanation

Find the weighted average return (0.10)(–5) + (0.30)(–2) + (0.50)(10) + (0.10)(31) = 7%.

Next, take differences, square them, multiply by the probability of the event and add them up. That is the variance. Take the square root of the variance for Std. Dev. $(0.1)(-5 - 7)^2 + (0.3)(-2 - 7)^2 + (0.5)(10 - 7)^2 + (0.1)(31 - 7)^2 = 100.8$ = variance.

$100.8^{0.5} = 10.04\%$.

(Module 5.1, LOS 5.a)

Question #20 of 31

Question ID: 1572818

Expected returns and standard deviations of returns for three portfolios are shown in the following table:

Portfolio	Expected Return	Standard Deviation
1	9%	5%
2	8%	4%
3	7%	3%

Assuming the risk-free rate is 3%, an investor who wants to minimize the probability of returns less than 5% should choose:

A) Portfolio 2.

B) Portfolio 3.

C) Portfolio 1.

Explanation

The probability of returns less than 5% can be minimized by selecting the portfolio with the greatest safety-first ratio using a threshold return of 5%:

Portfolio 1 = (9 – 5) / 5 = 4/5 = 0.80

Portfolio 2 = (8 – 5) / 4 = 3/4 = 0.75

Portfolio 3 = (7 – 5) / 3 = 2/3 = 0.67

(Module 5.1, LOS 5.c)

Question #21 of 31

Question ID: 1572800

Tully Advisers, Inc., has determined four possible economic scenarios and has projected the portfolio returns for two portfolios for their client under each scenario. Tully's economist has estimated the probability of each scenario, as shown in the table below. Given this information, what is the standard deviation of returns on portfolio A?

Scenario	Probability	Return on Portfolio A	Return on Portfolio B
A	15%	18%	19%
B	20%	17%	18%
C	25%	11%	10%
D	40%	7%	9%

A) 1.140%.

B) 5.992%.

C) 4.53%.

Explanation

$E(R_A) = 11.65\%$

$\sigma^2 = 0.0020506 = 0.15(0.18 - 0.1165)^2 + 0.2(0.17 - 0.1165)^2 + 0.25(0.11 - 0.1165)^2 + 0.4(0.07 - 0.1165)^2$

$\sigma = 0.0452836$

(Module 5.1, LOS 5.a)

Question #22 of 31

Question ID: 1572816

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) Flake.

B) Grant.

C) Epps.

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.

(Module 5.1, LOS 5.c)

Question #23 of 31

Question ID: 1572813

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) 3.

C) 2.

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.

(Module 5.1, LOS 5.c)

Question #24 of 31

Question ID: 1572789

The covariance of the returns on investments X and Y is 18.17. The standard deviation of returns on X is 7%, and the standard deviation of returns on Y is 4%. What is the value of the correlation coefficient for returns on investments X and Y?

A) +0.65.

B) +0.32.

C) +0.85.

Explanation

The correlation coefficient = Cov (X,Y) / [(Std Dev. X)(Std. Dev. Y)] = 18.17 / 28 = 0.65

(Module 5.1, LOS 5.a)

Question #25 of 31

Question ID: 1572790

If given the standard deviations of the returns of two assets and the correlation between the two assets, which of the following would an analyst *least likely* be able to derive from these?

A) Strength of the linear relationship between the two.

B) Expected returns.

C) Covariance between the returns.

Explanation

The correlations and standard deviations cannot give a measure of central tendency, such as the expected value.

(Module 5.1, LOS 5.a)

Question #26 of 31

Question ID: 1572788

The covariance of returns on two investments over a 10-year period is 0.009. If the variance of returns for investment A is 0.020 and the variance of returns for investment B is 0.033, what is the correlation coefficient for the returns?

A) 0.444.

B) 0.350.

C) 0.687.

Explanation

The correlation coefficient is: Cov(A,B) / [(Std Dev A)(Std Dev B)] = 0.009 / [(√0.02)(√0.033)] = 0.350.

(Module 5.1, LOS 5.a)

Question #27 of 31

Question ID: 1572791

The returns on assets C and D are strongly correlated with a correlation coefficient of 0.80. The variance of returns on C is 0.0009, and the variance of returns on D is 0.0036. What is the covariance of returns on C and D?

A) 0.00144.

B) 0.03020.

C) 0.40110.

Explanation

$r = Cov(C,D) / (\sigma_C \times \sigma_D)$

$\sigma_C = (0.0009)^{0.5} = 0.03$

$\sigma_D = (0.0036)^{0.5} = 0.06$

$0.8(0.03)(0.06) = 0.00144$

(Module 5.1, LOS 5.a)

Question #28 of 31

Question ID: 1572797

Compute the standard deviation of a two-stock portfolio if stock A (40% weight) has a variance of 0.0015, stock B (60% weight) has a variance of 0.0021, and the correlation coefficient for the two stocks is –0.35?

A) 1.39%.

B) 0.07%.

C) 2.64%.

Explanation

The standard deviation of the portfolio is found by:

$$[W_1^2\sigma_1^2 + W_2^2\sigma_2^2 + 2W_1W_2\sigma_1\sigma_2\rho_{1,2}]^{0.5}$$

$$= [(0.40)^2(0.0015) + (0.60)^2 (0.0021) + (2)(0.40)(0.60)(0.0387)(0.0458)(-0.35)]^{0.5}$$

= 0.0264, or 2.64%.

(Module 5.1, LOS 5.a)

Question #29 of 31

Question ID: 1572814

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.

(Module 5.1, LOS 5.c)

Question #30 of 31

Question ID: 1572793

What is the standard deviation of a portfolio if you invest 30% in stock one (standard deviation of 4.6%) and 70% in stock two (standard deviation of 7.8%) if the correlation coefficient for the two stocks is 0.45?

A) 6.20%.

B) 0.38%.

C) 6.83%.

Explanation

The standard deviation of the portfolio is found by:

$[W_1^2\ \sigma_1^2 + W_2^2\ \sigma_2^2 + 2W_1W_2\sigma_1\sigma_2r_{1,2}]^{0.5}$, or $[(0.30)^2(0.046)^2 + (0.70)^2(0.078)^2 + (2)(0.30)(0.70)(0.046)(0.078)(0.45)]^{0.5} = 0.0620$, or 6.20%.

(Module 5.1, LOS 5.a)

Question #31 of 31

Question ID: 1572808

Joe Mayer, CFA, projects that XYZ Company's return on equity varies with the state of the economy in the following way:

State of Economy	Probability of Occurrence	Company Returns
Good	.20	20%
Normal	.50	15%
Poor	.30	10%

The standard deviation of XYZ's expected return on equity is *closest* to:

A) 3.5%.

B) 12.3%.

C) 1.5%.

Explanation

In order to calculate the standard deviation of the company returns, first calculate the expected return, then the variance, and the standard deviation is the square root of the variance.

The expected value of the company return is the probability weighted average of the possible outcomes: (0.20)(0.20) + (0.50)(0.15) + (0.30)(0.10) = 0.145.

The variance is the sum of the probability of each outcome multiplied by the squared deviation of each outcome from the expected return: $(0.2)(0.20 - 0.145)^2 + (0.5)(0.15 - 0.145)^2 + (0.3)(0.1-0.145)^2 = 0.000605 + 0.0000125 + 0.0006075 = 0.001225$.

The standard deviation is the square root of 0.001225 = 0.035 or 3.5%.;

(Module 5.1, LOS 5.b)