

## Chapter 6 Risk and Risk Aversion

### Multiple Choice Questions

1. A T-bill pays 6 percent rate of return. Would risk-averse investors invest in a risky portfolio that pays 12 percent with a probability of 40 percent or 2 percent with a probability of 60 percent?
  - A) Yes, because they are rewarded with a risk premium.
  - B) No, because they are not rewarded with a risk premium.
  - C) No, because the risk premium is small.
  - D) Cannot be determined.
  - E) None of the above.

Answer: B Difficulty: Moderate

Rationale: The risk averse investor will assume risk if the additional risk is rewarded by increased returns. Risky portfolio returns =  $12\%(0.4) + 2\%(0.6) = 6\%$  (no risk premium).

2. Which of the following statements regarding risk-averse investors is **true**?
  - A) They only care about the rate of return.
  - B) They accept investments that are fair games.
  - C) They only accept risky investments that offer risk premiums over the risk-free rate.
  - D) They are willing to accept lower returns and high risk.
  - E) A and B.

Answer: C Difficulty: Moderate

Rationale: See rationale for question 6.1.

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3. Which of the following statements is (are) **true**?

- I) Risk-averse investors reject investments that are fair games.
- II) Risk-neutral investors judge risky investments only by the expected returns.
- III) Risk-averse investors judge investments only by their riskiness.
- IV) Risk-loving investors will not engage in fair games.

- A) I only
- B) II only
- C) I and II only
- D) II and III only
- E) II, III, and IV only

Answer: C Difficulty: Moderate

Rationale: Risk-averse investors consider a risky investment only if the investment offers a risk premium. Risk-neutral investors look only at expected returns when making an investment decision.

4. In the mean-standard deviation graph an indifference curve has a \_\_\_\_\_ slope.

- A) negative
- B) zero
- C) positive
- D) northeast
- E) cannot be determined

Answer: C Difficulty: Easy

Rationale: The risk-return trade-off is one in which greater risk is taken if greater returns can be expected, resulting in a positive slope.

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5. In the mean-standard deviation graph, which one of the following statements is **true** regarding the indifference curve of a risk-averse investor?
- A) It is the locus of portfolios that have the same expected rates of return and different standard deviations.
  - B) It is the locus of portfolios that have the same standard deviations and different rates of return.
  - C) It is the locus of portfolios that offer the same utility according to returns and standard deviations.
  - D) It connects portfolios that offer increasing utilities according to returns and standard deviations.
  - E) none of the above.

Answer: C Difficulty: Moderate

Rationale: Indifference curves plot trade-off alternatives that provide equal utility to the individual (in this case, the trade-offs are the risk-return characteristics of the portfolios).

6. In a return-standard deviation space, which of the following statements is (are) **true** for risk-averse investors? (The vertical and horizontal lines are referred to as the expected return-axis and the standard deviation-axis, respectively.)
- I) An investor's own indifference curves might intersect.
  - II) Indifference curves have negative slopes.
  - III) In a set of indifference curves, the highest offers the greatest utility.
  - IV) Indifference curves of two investors might intersect.
- A) I and II only
  - B) II and III only
  - C) I and IV only
  - D) III and IV only
  - E) none of the above

Answer: D Difficulty: Moderate

Rationale: An investor's indifference curves are parallel, and thus cannot intersect and have positive slopes. The highest indifference curve (the one in the most northwestern position) offers the greatest utility. Indifference curves of investors with similar risk-return trade-offs might intersect.

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7. Elias is a risk-averse investor. David is a less risk-averse investor than Elias. Therefore,
- A) for the same risk, David requires a higher rate of return than Elias.
  - B) for the same return, Elias tolerates higher risk than David.
  - C) for the same risk, Elias requires a lower rate of return than David.
  - D) for the same return, David tolerates higher risk than Elias.
  - E) cannot be determined.

Answer: D Difficulty: Moderate

Rationale: The more risk averse the investor, the less risk that is tolerated, given a rate of return.

8. When an investment advisor attempts to determine an investor's risk tolerance, which factor would they be **least** likely to assess?
- A) the investor's prior investing experience
  - B) the investor's degree of financial security
  - C) the investor's tendency to make risky or conservative choices
  - D) the level of return the investor prefers
  - E) the investor's feeling about loss

Answer: D Difficulty: Moderate

Rationale: See text box page 170.

Use the following to answer questions 9-10:

Consider the following two investment alternatives. First, a risky portfolio that pays a 15 percent rate of return with a probability of 60% or a 5 percent return with a probability of 40%, and second, a T-bill that pays 6 percent.

9. The risk premium on the risky investment is
- A) 11 percent.
  - B) 1 percent.
  - C) 9 percent.
  - D) 5 percent.
  - E) none of the above.

Answer: D Difficulty: Moderate

Rationale:  $15\%(0.6) + 5\%(0.4) = 11\%$ ;  $11\% - 6\% = 5\%$ .

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10. If you invest \$50,000 in the risky portfolio, your expected profit would be\_\_\_\_\_.
- A) \$5,500
  - B) \$7,500
  - C) \$25,000
  - D) \$3,000
  - E) none of the above

Answer: A Difficulty: Moderate

Rationale:  $\$50,000(0.11) = \$5,500$ .

11. If a T-bill pays 5 percent, which of the following investments would **not** be chosen by a risk-averse investor?
- A) An asset that pays 10 percent with a probability of 0.60 or 2 percent with a probability of 0.40.
  - B) An asset that pays 10 percent with a probability of 0.40 or 2 percent with a probability of 0.60.
  - C) An asset that pays 10 percent with a probability of 0.20 or 3.75 percent with a probability of 0.80.
  - D) An asset that pays 10 percent with a probability of 0.30 or 3.75 percent with a probability of 0.70.
  - E) neither **a** nor **b** would be chosen.

Answer: C Difficulty: Moderate

Rationale:  $10\%(0.2) + 3.75\%(0.8) = 5\%$  (no risk premium). Other alternatives pay a risk premium. (Note that all alternatives must be calculated to answer this question.)

Use the following to answer questions 12-13:

Assume an investor with the following utility function:  $U = E(r) - 3/2(s^2)$ .

12. To maximize her expected utility, she would choose the asset with an expected rate of return of \_\_\_\_\_ and a standard deviation of \_\_\_\_\_, respectively.
- A) 12%; 20%
  - B) 10%; 15%
  - C) 10%; 10%
  - D) 8%; 10%
  - E) none of the above

Answer: C Difficulty: Moderate

Rationale:  $U = 0.10 - 3/2(0.10)^2 = 8.5\%$ ; highest utility of choices.

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13. To maximize her expected utility, which one of the following investment alternatives would she choose?
- A) A portfolio that pays 10 percent with a 60 percent probability or 5 percent with 40 percent probability.
  - B) A portfolio that pays 10 percent with 40 percent probability or 5 percent with a 60 percent probability.
  - C) A portfolio that pays 12 percent with 60 percent probability or 5 percent with 40 percent probability.
  - D) A portfolio that pays 12 percent with 40 percent probability or 5 percent with 60 percent probability.
  - E) none of the above.

Answer: C Difficulty: Difficult

Rationale:  $U(c) = 9.02\%$ ; highest utility of possibilities.

14. A portfolio has an expected rate of return of 0.15 and a standard deviation of 0.15. The risk-free rate is 6 percent. An investor has the following utility function:  $U = E(r) - (A/2)s^2$ . Which value of A makes this investor indifferent between the risky portfolio and the risk-free asset?
- A) 5
  - B) 6
  - C) 7
  - D) 8
  - E) none of the above

Answer: D Difficulty: Difficult

Rationale:  $0.06 = 0.15 - A/2(0.15)^2$ ;  $0.06 - 0.15 = -A/2(0.0225)$ ;  $-0.09 = -0.01125A$ ;  $A = 8$ ;  $U = 0.15 - 8/2(0.15)^2 = 6\%$ ;  $U(R_f) = 6\%$ .

15. According to the mean-variance criterion, which one of the following investments dominates all others?
- A)  $E(r) = 0.15$ ; Variance = 0.20
  - B)  $E(r) = 0.10$ ; Variance = 0.20
  - C)  $E(r) = 0.10$ ; Variance = 0.25
  - D)  $E(r) = 0.15$ ; Variance = 0.25
  - E) none of these is dominates the other alternatives.

Answer: A Difficulty: Difficult

Rationale: A gives the highest return with the least risk; return per unit of risk is .75, which dominates the reward-risk ratio for the other choices.

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16. Consider a risky portfolio, A, with an expected rate of return of 0.15 and a standard deviation of 0.15, that lies on a given indifference curve. Which one of the following portfolios might lie on the same indifference curve?
- A)  $E(r) = 0.15$ ; Standard deviation = 0.20
  - B)  $E(r) = 0.15$ ; Standard deviation = 0.10
  - C)  $E(r) = 0.10$ ; Standard deviation = 0.10
  - D)  $E(r) = 0.20$ ; Standard deviation = 0.15
  - E)  $E(r) = 0.10$ ; Standard deviation = 0.20

Answer: C Difficulty: Difficult

Rationale: Portfolio A has a reward to risk ratio of 1.0; portfolio C is the only choice with the same risk-return tradeoff.

Use the following to answer questions 17-19:

<u>Investment</u>	<u>Expected Return E(r)</u>	<u>Standard Deviation</u>
1	0.12	0.3
2	0.15	0.5
3	0.21	0.16
4	0.24	0.21

$U = E(r) - (A/2)s^2$ , where  $A = 4.0$ .

17. Based on the utility function above, which investment would you select?
- A) 1
  - B) 2
  - C) 3
  - D) 4
  - E) cannot tell from the information given

Answer: C Difficulty: Difficult

Rationale:  $U(c) = 0.21 - 4/2(0.16)^2 = 15.88$  (highest utility of choices).

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18. Which investment would you select if you were risk neutral?
- A) 1
  - B) 2
  - C) 3
  - D) 4
  - E) cannot tell from the information given

Answer: D Difficulty: Difficult

Rationale: If you are risk neutral, your only concern is with return, not risk.

19. The variable (A) in the utility function represents the:
- A) investor's return requirement.
  - B) investor's aversion to risk.
  - C) certainty-equivalent rate of the portfolio.
  - D) minimum required utility of the portfolio.
  - E) none of the above.

Answer: B Difficulty: Moderate

Rationale: A is an arbitrary scale factor used to measure investor risk tolerance. The higher the value of A, the more risk averse the investor.

20. The exact indifference curves of different investors
- A) cannot be known with perfect certainty.
  - B) can be calculated precisely with the use of advanced calculus.
  - C) although not known with perfect certainty, do allow the advisor to create more suitable portfolios for the client.
  - D) A and C.
  - E) none of the above.

Answer: D Difficulty: Easy

Rationale: Indifference curves cannot be calculated precisely, but the theory does allow for the creation of more suitable portfolios for investors of differing levels of risk tolerance.



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21. The riskiness of individual assets
- A) should be considered for the asset in isolation.
  - B) should be considered in the context of the effect on overall portfolio volatility.
  - C) combined with the riskiness of other individual assets (in the proportions these assets constitute of the entire portfolio) should be the relevant risk measure.
  - D) B and C.
  - E) none of the above.

Answer: D Difficulty: Easy

Rationale: The relevant risk is portfolio risk; thus, the riskiness of an individual security should be considered in the context of the portfolio as a whole.

22. Which one of the following statements regarding hedging is **true**?
- A) Hedging is adding securities to an existing portfolio to increase the overall return.
  - B) Hedging is a strategy used by investors to increase both the risk and return of a portfolio.
  - C) Hedging is a strategy used by investors to reduce the risk of a portfolio.
  - D) Hedging is a strategy used to increase portfolio volatility.
  - E) None of the above is true.

Answer: C Difficulty: Moderate

Rationale: Hedging reduces risk, and involves investing in an asset with a payoff pattern that offsets the return volatility of other assets in the portfolio.

23. A fair game
- A) will not be undertaken by a risk-averse investor.
  - B) is a risky investment with a zero risk premium.
  - C) is a riskless investment.
  - D) Both A and B are true.
  - E) Both A and C are true.

Answer: D Difficulty: Moderate

Rationale: A fair game is a risky investment with a payoff exactly equal to its expected value. Since it offers no risk premium, it will not be acceptable to a risk-averse investor.

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24. You are a risk-averse investor. Portfolio A has  $E(r) = 12\%$  and  $s = 18\%$ . Portfolio B has  $s = 21\%$ , and has end-of-year cash flows of either \$84,000 or \$144,000 with equal probability. At what price for portfolio B would you be indifferent between A and B?
- A) \$100,000
  - B) \$101,786
  - C) \$84,000
  - D) \$121,000
  - E) None of the above

Answer: A Difficulty: Difficult

Rationale: Portfolio A has  $CV = .12/.18 = .6667$ , and so must B;  $CVB = .6667 = E(r)/.21$ ;  $E(r) = .14$ , so B must earn 14%. The expected terminal value for B is  $.5(84,000) + .5(144,000) = \$114,000$ ;  $14\% = (114,000 - P)/P$ ;  $P = \$100,000$

25. An investor can choose to invest in T-bills paying 5% or a risky portfolio with end-of-year cash flow of \$132,000. If the investor requires a risk premium of 5%, what would she be willing to pay for the risky portfolio?
- A) \$100,000
  - B) \$108,000
  - C) \$120,000
  - D) \$145,000
  - E) \$147,000

Answer: C Difficulty: Moderate

Rationale:  $(5\% + 5\%) = (132,000 - P) / P$ ;  $10\% (P) = 132,000 - P$ ;  $1.10 (P) = 132,000$ ;  $P = 120,000$ .

26. The presence of risk means that
- A) investors will lose money.
  - B) more than one outcome is possible.
  - C) the standard deviation of the payoff is larger than its expected value.
  - D) final wealth will be greater than initial wealth.
  - E) terminal wealth will be less than initial wealth.

Answer: B Difficulty: Easy

Rationale: The presence of risk means that more than one outcome is possible.

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27. The utility score an investor assigns to a particular portfolio, other things equal,
- A) will decrease as the rate of return increases.
  - B) will decrease as the standard deviation increases.
  - C) will decrease as the variance increases.
  - D) will increase as the variance increases.
  - E) will increase as the rate of return increases.

Answer: E Difficulty: Easy

Rationale: Utility is enhanced by higher expected returns and diminished by higher risk.

28. The certainty equivalent rate of a portfolio is
- A) the rate that a risk-free investment would need to offer with certainty to be considered equally attractive as the risky portfolio.
  - B) the rate that the investor must earn for certain to give up the use of his money.
  - C) the minimum rate guaranteed by institutions such as banks.
  - D) the rate that equates “A” in the utility function with the average risk aversion coefficient for all risk-averse investors.
  - E) represented by the scaling factor “-.005” in the utility function.

Answer: A Difficulty: Moderate

29. According to the mean-variance criterion, which of the statements below is correct?

Investment	E(r)	Standard Deviation
A	10%	5%
B	21%	11%
C	18%	23%
D	24%	16%

- A) Investment B dominates Investment A.
- B) Investment B dominates Investment C.
- C) Investment D dominates all of the other investments.
- D) Investment D dominates only Investment B.
- E) Investment C dominates investment A.

Answer: B Difficulty: Moderate

Rationale: This question tests the student's understanding of how to apply the mean-variance criterion.

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30. Adding a home insurance policy to your portfolio of assets is an example of \_\_\_\_\_.  
A) speculating  
B) asset dominance  
C) hedging  
D) neurosis  
E) risk neutrality

Answer: C Difficulty: Easy

31. Which of the following sayings illustrates the concept of diversification?  
A) Don't throw the baby out with the bathwater.  
B) A stitch in time saves nine.  
C) Neither a borrower nor a lender be.  
D) Don't put all your eggs in one basket.  
E) Out of sight, out of mind.

Answer: D Difficulty: Easy

32. The standard deviation of a portfolio of assets  
A) increases as the number of assets in the portfolio increases.  
B) increases as the weight in any particular asset increases.  
C) increases as the standard deviations of the assets change through time.  
D) increases as the assets' expected returns increase.  
E) increases as the assets' covariances increase.

Answer: E Difficulty: Difficult

Rationale: To answer this question the student must understand the variables that are included in the equation for a portfolio's standard deviation and evaluate the potential impact of a change in each of the variables.

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33. Steve is more risk-averse than Edie. On a graph that shows Steve and Edie's indifference curves, which of the following is true? Assume that the graph shows expected return on the vertical axis and standard deviation on the horizontal axis.
- I) Steve and Edie's indifference curves might intersect.
  - II) Steve's indifference curves will have flatter slopes than Edie's.
  - III) Steve's indifference curves will have steeper slopes than Edie's.
  - IV) Steve and Edie's indifference curves will not intersect.
  - V) Steve's indifference curves will be downward sloping and Edie's will be upward sloping.
- A) I and V
  - B) I and III
  - C) III and IV
  - D) I and II
  - E) II and IV

Answer: B Difficulty: Moderate

Rationale: This question tests whether the student understands the graphical properties of indifference curves and how they relate to the degree of risk tolerance.

Use the following to answer questions 34-38:

State of the Market	Probability	Return on Indigo Engines Inc.	Return on Taupe Tables Inc.
High	0.7	14%	22%
Low	0.3	6%	3%

34. What are the expected returns of Indigo Engines and Taupe Tables, respectively?
- A) 9.7% and 15.2%
  - B) 10.1% and 17.4%
  - C) 11.6% and 16.3%
  - D) 8.4% and 6.8%
  - E) 12.5% and 13.9%

Answer: C Difficulty: Easy

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35. What are the standard deviations of Indigo Engines and Taupe Tables, respectively?
- A) 2.98% and 6.45%
  - B) 3.67% and 8.71%
  - C) 4.59% and 11.92%
  - D) 3.84% and 9.12%
  - E) 5.91% and 10.47%

Answer: B Difficulty: Moderate

36. What is the covariance between Indigo Engines and Taupe Tables?
- A) .003192
  - B) .067541
  - C) .002498
  - D) .055437
  - E) .011479

Answer: A Difficulty: Difficult

37. What is the expected return on a portfolio that has 60% in Indigo Engines and 40% in Taupe Tables?
- A) 11.96%
  - B) 8.41%
  - C) 10.62%
  - D) 14.73%
  - E) 13.48%

Answer: E Difficulty: Moderate

38. What is the standard deviation of a portfolio that has 60% in Indigo Engines and 40% in Taupe Tables?
- A) 12.93%
  - B) 7.94%
  - C) 5.68%
  - D) 3.97%
  - E) 13.42%

Answer: C Difficulty: Difficult

Use the following to answer questions 39-40:

Consider the following two investment alternatives. First, a risky portfolio that pays a 12 percent rate of return with a probability of 50% or a 4 percent return with a probability of 50%, and second, a T-bill that pays 3 percent.

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39. The risk premium on the risky investment is
- A) 11 percent.
  - B) 1 percent.
  - C) 9 percent.
  - D) 5 percent.
  - E) none of the above.

Answer: D Difficulty: Moderate

Rationale:  $12\%(.5) + 4\%(.5) = 8\%$ ;  $8\% - 3\% = 5\%$ .

40. If you invest \$20,000 in the risky portfolio, your expected profit would be\_\_\_\_\_.
- A) \$5,500
  - B) \$7,500
  - C) \$25,000
  - D) \$1,600
  - E) none of the above

Answer: D Difficulty: Moderate

Rationale:  $\$20,000(0.08) = \$1,600$ .

41. If a T-bill pays 2.5 percent, which of the following investments would **not** be chosen by a risk-averse investor?
- A) An asset that pays 10 percent with a probability of 0.60 or 2 percent with a probability of 0.40.
  - B) An asset that pays 10 percent with a probability of 0.40 or 2 percent with a probability of 0.60.
  - C) An asset that pays 10 percent with a probability of 0.20 or 0 percent with a probability of 0.80.
  - D) An asset that pays 10 percent with a probability of 0.30 or 3.75 percent with a probability of 0.70.
  - E) Neither A nor B would be chosen.

Answer: C Difficulty: Moderate

Rationale:  $10\%(0.2) + 0\%(0.8) = 2\%$  (no risk premium). Other alternatives pay a risk premium. (Note that all alternatives must be calculated to answer this question.)

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Use the following to answer questions 42-43:

Consider the following two investment alternatives. First, a risky portfolio that pays a 15 percent rate of return with a probability of 75% or a 4 percent return with a probability of 25%, and second, a T-bill that pays 2.5 percent.

42. The risk premium on the risky investment is
- A) 11 percent.
  - B) 1 percent.
  - C) 9.75 percent.
  - D) 5 percent.
  - E) none of the above.

Answer: C Difficulty: Moderate

Rationale:  $15\%(.75) + 4\%(.25) = 12.25\%$ ;  $12.25\% - 2.5\% = 9.75\%$ .

43. If you invest \$120,000 in the risky portfolio, your expected profit would be\_\_\_\_\_.
- A) \$15,500
  - B) \$17,500
  - C) \$14,700
  - D) \$13,000
  - E) none of the above

Answer: C Difficulty: Moderate

Rationale:  $\$120,000(0.1225) = \$14,700$ .

Use the following to answer questions 44-45:

Consider the following two investment alternatives. First, a risky portfolio that pays a 20 percent rate of return with a probability of 65% or a 7 percent return with a probability of 35%, and second, a T-bill that pays 3 percent.



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44. The risk premium on the risky investment is
- A) 12.45 percent.
  - B) 13.1 percent.
  - C) 9.75 percent.
  - D) 15.6 percent.
  - E) none of the above.

Answer: A Difficulty: Moderate

Rationale:  $20\%(.65) + 7\%(.35) = 15.45\%$ ;  $15.45\% - 3\% = 12.45\%$ .

45. If you invest \$100,000 in the risky portfolio, your expected profit would be\_\_\_\_\_.
- A) \$15,450
  - B) \$17,500
  - C) \$14,700
  - D) \$13,000
  - E) none of the above

Answer: A Difficulty: Moderate

Rationale:  $\$100,000(0.1545) = \$15,450$ .

46. An investor can choose to invest in T-bills paying 3% or a risky portfolio with end-of-year cash flow of \$18,000. If the investor requires a risk premium of 7%, what would she be willing to pay for the risky portfolio?
- A) \$18,000.00
  - B) \$16,363.64
  - C) \$17,264.81
  - D) \$15,956.12
  - E) \$14,700.96

Answer: B Difficulty: Moderate

Rationale:  $(3\% + 7\%) = (18,000 - P) / P$ ;  $10\% (P) = 18,000 - P$ ;  $1.10 (P) = 18,000$ ;  $P = 16,363.64$ .

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47. An investor can choose to invest in T-bills paying 4% or a risky portfolio with end-of-year cash flow of \$12,000. If the investor requires a risk premium of 3%, what would she be willing to pay for the risky portfolio?
- A) \$10,000.00
  - B) \$11,111.11
  - C) \$12,222.22
  - D) \$14,555.55
  - E) \$11,214.95

Answer: E Difficulty: Moderate

Rationale:  $(4\% + 3\%) = (12,000 - P) / P$ ;  $7\% (P) = 12,000 - P$ ;  $1.07 (P) = 12,000$ ;  $P = 11,214.95$ .

48. An investor can choose to invest in T-bills paying 2% or a risky portfolio with end-of-year cash flow of \$4,000. If the investor requires a risk premium of 6%, what would she be willing to pay for the risky portfolio?
- A) \$3,669.13
  - B) \$3,703.70
  - C) \$3,567.89
  - D) \$4,212.88
  - E) \$2,753.46

Answer: B Difficulty: Moderate

Rationale:  $(2\% + 6\%) = (4,000 - P) / P$ ;  $8\% (P) = 4,000 - P$ ;  $1.08 (P) = 4,000$ ;  $P = 3,703.70$ .

49. The standard deviation of a portfolio that has 20% of its value invested in a risk-free asset and 80% of its value invested in a risky asset with a standard deviation of 20% is \_\_\_\_%.
- A) 18
  - B) 14
  - C) 12
  - D) 20
  - E) 16

Answer: E Difficulty: Moderate

Rationale:  $(.8)(20\%) = 16$

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50. The standard deviation of a portfolio that has 40% of its value invested in a risk-free asset and 60% of its value invested in a risky asset with a standard deviation of 40% is \_\_\_\_%.
- A) 18
  - B) 14
  - C) 19
  - D) 24
  - E) 20

Answer: D Difficulty: Moderate

Rationale:  $(.6)(40\%) = 24$

51. The standard deviation of a portfolio that has 30% of its value invested in a risk-free asset and 70% of its value invested in a risky asset with a standard deviation of 30% is \_\_\_\_%.
- A) 18
  - B) 14
  - C) 21
  - D) 24
  - E) 20

Answer: C Difficulty: Moderate

Rationale:  $(.7)(30\%) = 21$

52. If the standard deviation of stock 'A' is 30, the standard deviation of stock 'B' is 30, and the correlation between stocks 'A' and 'B' is 0.8, the covariance between stocks 'A' and 'B' is \_\_\_\_.
- A) 900
  - B) 24
  - C) 720
  - D) 30
  - E) 642

Answer: C Difficulty: Moderate

Rationale:  $(.8)(30)(30) = 720$

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53. If the standard deviation of stock 'A' is 40, the standard deviation of stock 'B' is 32, and the correlation between stocks 'A' and 'B' is 0.75, the covariance between stocks 'A' and 'B' is \_\_\_\_.
- A) 1,280
  - B) 40
  - C) 32
  - D) 0.75
  - E) 960

Answer: E Difficulty: Moderate

Rationale:  $(.75)(40)(32) = 960$

54. If the standard deviation of stock 'A' is 38, the standard deviation of stock 'B' is 27, and the correlation between stocks 'A' and 'B' is -0.6, the covariance between stocks 'A' and 'B' is \_\_\_\_.
- A) 615.6
  - B) -615.6
  - C) 27
  - D) -27
  - E) 417.23

Answer: B Difficulty: Moderate

Rationale:  $(-0.6)(38)(27) = -615.6$

55. If the standard deviation of stock 'A' is 29, the standard deviation of stock 'B' is 31, and the covariance between stocks 'A' and 'B' is 486.25, the correlation between stocks 'A' and 'B' is \_\_\_\_.
- A) 0.54
  - B) 0.45
  - C) 0.27
  - D) -0.27
  - E) 417.23

Answer: A Difficulty: Moderate

Rationale:  $(486.25)/(29)(31) = 0.54$

## Chapter 6 Risk and Risk Aversion

56. If the standard deviation of stock 'A' is 28, the standard deviation of stock 'B' is 24, and the covariance between stocks 'A' and 'B' is 556, the correlation between stocks 'A' and 'B' is \_\_\_\_.
- A) 0.54
  - B) 0.83
  - C) -0.83
  - D) -0.54
  - E) 4.23

Answer: B Difficulty: Moderate

Rationale:  $(556)/(28)(24) = 0.827$

57. If the standard deviation of stock 'A' is 25, the standard deviation of stock 'B' is 22, and the covariance between stocks 'A' and 'B' is -402, the correlation between stocks 'A' and 'B' is \_\_\_\_.
- A) 0.54
  - B) 0.45
  - C) 0.73
  - D) -0.73
  - E) 417.23

Answer: D Difficulty: Moderate

Rationale:  $(-402)/(25)(22) = -0.73$

58. Assume that a portfolio is invested in three securities. Security 'A' has an expected return of 8%, security 'B' has an expected return of 10%, and security 'C' has an expected return of 14%. If the portfolio weights are 20%, 40%, and 40% respectively, the expected return on the portfolio should be \_\_\_\_%.
- A) 11.2
  - B) 12.4
  - C) 10.7
  - D) 9.8
  - E) none of the above

Answer: A Difficulty: Moderate

Rationale:  $(.2)(8\%)+(.4)(10\%)+(.4)(14\%) = 11.2\%$

## Chapter 6 Risk and Risk Aversion

59. Assume that a portfolio is invested in three securities. Security 'A' has an expected return of 10%, security 'B' has an expected return of 16%, and security 'C' has an expected return of 7%. If the portfolio weights are 30%, 50%, and 20% respectively, the expected return on the portfolio should be \_\_\_\_%.
- A) 11.2
  - B) 12.4
  - C) 10.7
  - D) 9.8
  - E) none of the above

Answer: B Difficulty: Moderate

Rationale:  $(.3)(10\%)+(.5)(16\%)+(.2)(7\%) = 12.4\%$

60. Assume that a portfolio is invested in three securities. Security 'A' has an expected return of 12%, security 'B' has an expected return of 14%, and security 'C' has an expected return of 18%. If the portfolio weights are 25%, 60%, and 15% respectively, the expected return on the portfolio should be \_\_\_\_%.
- A) 11.2
  - B) 12.4
  - C) 10.7
  - D) 9.8
  - E) none of the above

Answer: E Difficulty: Moderate

Rationale:  $(.25)(12\%)+(.6)(14\%)+(.15)(18\%) = 14.1\%$

## Chapter 6 Risk and Risk Aversion

### Short Answer Questions

61. Discuss the differences between investors who are **risk averse**, **risk neutral**, and **risk loving**.

Answer: The investor who is **risk averse** will take additional risk only if that risk-taking is likely to be rewarded with a risk premium. This investor examines the potential risk-return trade-offs of investment alternatives. The investor who is **risk neutral** looks only at the expected returns of the investment alternative and does not consider risk; this investor will select the investment alternative with the highest expected rate of return. The **risk lover** will engage in fair games and gambles; this investor adjusts the expected return upward to take into account the "fun" of confronting risk.

The purpose of this question is to ascertain that the student understands the different attitudes toward risk exhibited by different individuals.

Difficulty: Easy

62. Discuss concepts **covariance** and **correlation**. How do these concepts differ in terms of calculation and interpretation?

Answer: **Covariance** is a measure of the how the returns of one security move relative to the returns of another security. Covariance may be interpreted as a sign, but not magnitude. That is, a positive covariance indicates that the returns of the security move together; a negative covariance indicates that the returns of the securities move in opposition to each other. Nothing more can be interpreted from covariance.

**Correlation** is covariance standardized; that is, correlation is covariance divided by the product of the standard deviations of the two securities' returns. Thus, correlation coefficients may assume values between - 1 and + 1. As a result, both the sign and the magnitude of the correlation coefficient may be interpreted as to how the returns of two securities move relative to each other, and the degree of this relationship.

The rationale for this question is to ascertain that the student understands the differences between these two important and related measures of return relationships between securities.

Difficulty: Moderate

## Chapter 6 Risk and Risk Aversion

63. In the utility function:  $U = E(r) - 0.005As^2$ , what is the significance of "A"?

Answer: **A** is simply a scale factor indicating the investor's degree of risk aversion. The higher the value of **A**, the more risk averse the investor. Of course, the investment advisor must spend some time with client, either via personal conversation or the administration of a "risk tolerance quiz" in order to assign the appropriate value of **A** to a given investor.

The rationale for this question is to ascertain whether the student understands the meaning of the variable, **A**. This variable, as such, is not presented in most investments texts and it is important that the student understands how the investment advisor assigns a value to **A**.

Difficulty: Easy

64. What is a fair game? Explain how the term relates to a risk-averse investor's attitude toward speculation and risk and how the utility function reflects this attitude.

Answer: A fair game is a prospect that has a zero risk premium. Investors who are risk averse reject investment portfolios that are fair games or worse. They will consider risk-free investments and risky investments with positive risk premiums. The risk-averse investor "penalizes" the expected rate of return of a risky portfolio by a certain percent to account for the risk involved. The risk-averse investor's utility function favors expected return and disfavors risk, as measured by variance of returns. In the utility function  $U = E(R) - .005A * \text{Variance}$ , the risk-averse investor has a positive "A" value so that the second term reduces the level of utility as the variance increases.

This question tests whether the student understands the interrelationships between the terms risk, risk premium, speculation, and fair game, and how these terms are quantified by a utility function.

Difficulty: Moderate



## Chapter 6 Risk and Risk Aversion

65. Draw graphs that represent indifference curves for the following investors: Harry, who is a risk-averse investor; Eddie, who is a risk-neutral investor; and Ozzie, who is a risk-loving investor. Discuss the nature of each curve and the reasons for its shape.

Answer: The graph for Harry should show upward-sloping curves because he needs to be compensated with additional expected return to maintain a certain level of satisfaction when he takes on more risk. Eddie should have horizontal indifference curves, parallel to the X axis. Since he is risk-neutral, he only cares about expected return. The higher the expected return, the higher his utility. Ozzie's curves will be downward sloping. The fact that he likes risk means that he is willing to forego some expected return to have the opportunity to take on more risk.

This question allows the student to review the concepts of attitude toward risk and utility as they related to the resulting indifference curves.

Difficulty: Moderate

66. Toby and Hannah are two risk-averse investors. Toby is more risk-averse than Hannah. Draw one indifference curve for Toby and one indifference curve for Hannah on the same graph. Show how these curves illustrate their relative levels of risk aversion.

Answer: The curves may or may not intersect within the range of the graph. Toby's curve will have a steeper slope than Hannah's. The levels of risk aversion can be illustrated by examining the curves' slopes over a fixed range. Because Toby's curve is steeper than Hannah's, for a fixed change in standard deviation on the horizontal axis, he will have a greater change in expected return on the vertical axis. It takes more compensation in the form of expected return to allow Toby to maintain his level of utility than it takes for Hannah.

This question tests whether the student understands the nature of indifference curves and how the risk-return tradeoff is related to the level of risk aversion.

Difficulty: Moderate