Risk and Return

1. The Duncan Company's stock is currently selling for $15. People generally expect its price to rise to $18 by the end of next year and that it will pay a dividend of $.50 per share during the year. What is the expected return on an investment in Duncan's stock?
   - a. 25.3%
   - b. 22.5%
   - c. 23.3%
   - d. 17.1%

2. The Duncan Company's stock is currently selling for $15. People generally expect its price to rise to $18 by the end of next year and that it will pay a dividend of $.50 per share during the year. Calculate the actual return on Duncan if at the end of the year the price turns out to be $13 and the dividend actually paid was just $0.10.
   - a. 12.7%
   - b. 11.7%
   - c. 12.3%
   - d. 11.3%

3. Jean LeClerc has estimated that an investment will return FF100 per year for 10 years and that, because of uncertainty, the investment must promise a return equal to 10%. What is the value of this investment to this investor?
   - a. FF6,1450
   - b. FF6,1450
   - c. FF440.15
   - d. FF520.15

4. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required rate of return is 7%?
   - a. FF4100
   - b. FF369
   - c. FF713
   - d. FF1082
5. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required rate of return is 9%?
   a. FF650
   b. FF1000
   c. FF389
   d. FF1050

6. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required annual rate of return is 11%?
   a. FF926
   b. FF593
   c. FF696
   d. FF996

7. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 5 years?
   a. FF10,000
   b. FF33,520
   c. FF3,352
   d. FF1,000

8. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 10 years?
   a. FF5,019
   b. FF10,000
   c. FF50,190
   d. FF5090

9. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 20 years?
   a. FF62,590
   b. FF10,000
   c. FF6,259
   d. FF69,250
10. What is an investment worth that promises to return FF10,000 per year, given a required rate of return of 15% if the benefits are expected indefinitely into the future?
   a. FF15,000
   b. FF66,667
   c. FF10,000
   d. FF6,667

11. You have the opportunity to purchase a contract that promises to pay the owner of the contract $10,000 per year forever. If your required annual rate of return is 16%, would you purchase this contract if the offering price were $70,000?
   a. Yes, purchase for $70,000
   b. No, do not purchase for $70,000

12. A company is evaluating an investment that is sensitive to changes in the national economy. If the economy is expanding rapidly, the investment will generate cash flows of $750,000 per year; if there is mild growth, $500,000; if there is a recession, $250,000. The company's staff economists estimate there is a 20% chance that there will be rapid expansion, a 60% chance of mild growth, and a 20% chance of recession. Given this information calculate the expected cash flow and the standard deviation of the cash flows from this proposed investment. What is the coefficient of variation (CV) of the cash flows from this proposed investment?
   a. Coefficient of variation, 0.316
   b. Coefficient of variation, 3.106
   c. Coefficient of variation, 0.158
   d. Coefficient of variation, 0.114

13. The expected rate of return for the stock of Cornhusker Enterprises is 20 percent, with a standard deviation of 15 percent. The expected rate of return for the stock of Mustang Associates is 10 percent, with a standard deviation of 9 percent. Which stock would you consider to be riskier? Why?
   a. Cornhusker is riskier
   b. Mustang is riskier

14. An investor currently has all of his wealth in Treasury bills. He is considering investing one-third of his funds in Delta Airlines, whose beta is 1.30, with the remainder left in Treasury bills. The expected risk-free rate (Treasury bills) is 6 percent and the market risk premium is 8.8 percent. Determine the beta and the expected return on the
   a. 0.0; 14%
   b. 0.17; 17.44%
   c. 0.43; 9.81%
   d. 0.66; 13.4%
15. The stock of Pizza Hot, Inc., a Mexican pizza chain, has an estimated beta of 1.5. Calculate the required rate of return on Pizza Hot's stock if the SML is estimated as follows:
\[ k_i = 0.06 + 0.088 \beta \]
based on an initial inflation expectation of 4 percent.
- a. 8.8%
- b. 19.2%
- c. 16.6%
- d. 18.7%

16. The stock of Pizza Hot, Inc., a Mexican pizza chain, has an estimated beta of 1.5. Calculate the required rate of return on Pizza Hot's stock if the SML is estimated as follows:
\[ k_i = 0.06 + 0.088 \beta \]
based on a new inflation expectation of 6 percent.
- a. 12.2%
- b. 15.8%
- c. 21.2%
- d. 12.2%

17. The SML has been estimated as follows:
\[ k_i = 0.06 + 0.088 \beta \]
Suppose that the market risk premium \((k_m - k_{RF})\) increases by 1.2 percentage points (i.e., 0.012) as the result of an increase in uncertainty about the future economic outlook. Calculate the required rate of return on Meditek stock (whose estimated beta is 1.25) before and after the change in the market risk premium.
- a. 17%; 18.5%
- b. 16%; 17.3%
- c. 17.3%; 18.9%
- d. 18%; 19.2%

18. Suppose a U.S. Treasury bill, maturing in 1 year, can be purchased today for $92,500. Assuming that the security is held until maturity, the investor will receive $100,000 (face amount). Determine the rate of return on this investment.
- a. 9.55%
- b. 8.11%
- c. 7.28%
- d. 9.25%
19. Find the beta of a portfolio of three stocks. One third of the portfolio is invested in each of the stocks. The stocks and their betas are as follows: Mallmart, beta 1.10; Peak Power Co., beta 0.85; and Micro Ease, beta 1.40.
   a. 1.115
   b. 1.401
   c. 1.110
   d. 1.853

20. You have two assets in your investment portfolio: a stock mutual fund with a beta of 1.20 and U.S. treasury securities (assume that they are risk-free). What is the beta of your portfolio if 40% of your funds are invested in the treasury securities?
   a. 0.60
   b. 0.40
   c. 0.81
   d. 0.72

21. Given that the required return on the market portfolio is 18.80% and the current risk-free rate of return is 8.3%, calculate the required rates of return on the common stock of three corporations with the following betas: Firm A = 0.10; Firm B = 0.60; and Firm C = 1.20.
   a. 14%; 10.3%; 19.2%
   b. 9.35%; 14.6%; 20.9%
   c. 8.3%; 18.8%; 12.6%
   d. 12.6%; 21.1%; 14.6%

22. You have the following information on two securities in which you have invested:

<table>
<thead>
<tr>
<th>Security</th>
<th>Expected Return</th>
<th>Standard Deviation</th>
<th>Security Beta</th>
<th>% Invested (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xerox</td>
<td>15%</td>
<td>4.5%</td>
<td>1.20</td>
<td>35%</td>
</tr>
<tr>
<td>Kodak</td>
<td>12%</td>
<td>3.8%</td>
<td>0.98</td>
<td>65%</td>
</tr>
</tbody>
</table>

What is the expected return on the portfolio? What is the beta of the portfolio?
   a. 13.05%; 3.64%; 1.06
   b. 14.25%; 4.34%; 1.06
   c. 13.25%; 3.12%; 1.21
   d. 12.96%; 3.80%; 1.15
23. Realizing the benefits of diversification you have invested in the following securities:

<table>
<thead>
<tr>
<th>Security</th>
<th>United</th>
<th>Chubb</th>
<th>Chase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected return</td>
<td>12%</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Standard deviation of return</td>
<td>3%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Beta</td>
<td>1.65</td>
<td>1.2</td>
<td>0.89</td>
</tr>
<tr>
<td>Amount invested in each security</td>
<td>$50,000</td>
<td>$125,000</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

Compute the expected rate of return on the portfolio, and the beta of the portfolio.

- a. 13.8%; 1.17
- b. 12.1%; 1.20
- c. 12.6%; 1.31
- d. 13.1%; 1.29

24. Macedonia Oil is drilling an offshore oil well. The following table lists the expected cash flow from each possible outcome and, based on geological studies, the probability of each.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Cash Flow</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Well</td>
<td>-$1,000,000</td>
<td>0.30</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1,000,000</td>
<td>0.30</td>
</tr>
<tr>
<td>Gas and Oil</td>
<td>2,000,000</td>
<td>0.20</td>
</tr>
<tr>
<td>Oil</td>
<td>1,000,000</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Each cash flow will occur one year from today and will fully deplete the well. There is a cash outflow for a dry well due to shutdown expenses. Calculate the expected value of the cash flows from the well, and the standard deviation and coefficient of variation of the cash flows.

- a. $1,000,000; $600,000; 1.537
- b. $766,000; $1,512,250; 1.966
- c. $600,000; $1,113,553; 1.856
- d. $650,000; $1,211,353; 1.812
1. The Duncan Company's stock is currently selling for $15. People generally expect its price to rise to $18 by the end of next year and that it will pay a dividend of $.50 per share during the year. What is the expected return on an investment in Duncan's stock?

   a. 25.3%
   b. 22.5%
   c. 23.3%
   d. 17.1%

   ANSWER: c

   SOLUTION:

   \[
   \hat{k}_s = \frac{D_1 + (P_1 - P_0)}{P_0} \\
   \hat{k}_s = \frac{0.50 + (18 - 15)}{15} = 23.3\%
   \]

2. The Duncan Company's stock is currently selling for $15. People generally expect its price to rise to $18 by the end of next year and that it will pay a dividend of $.50 per share during the year. Calculate the actual return on Duncan if at the end of the year the price turns out to be $13 and the dividend actually paid was just $0.10.

   a. 12.7%
   b. 11.7%
   c. 12.3%
   d. 11.3%

   ANSWER: a

   SOLUTION:

   \[
   \hat{k}_s = \frac{0.10 + (13 - 15)}{15} = -12.7\%
   \]

3. Jean LeClerc has estimated that an investment will return FF100 per year for 10 years and that, because of uncertainty, the investment must promise a return equal to 10%. What is the value of this investment to this investor?

   a. FF6.1450
   b. FF614.50
   c. FF440.15
   d. FF520.15
PV = (Annual Cash Flow) \( (PVIFA_{10\%, 10}) \) 
(FF100) \( (6.145) \) = FF614.50

**KEYSTROKES:**

<table>
<thead>
<tr>
<th>HP</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 [PMT]</td>
<td>100 [PMT]</td>
</tr>
<tr>
<td>10 [N]</td>
<td>10 [N]</td>
</tr>
<tr>
<td>10 [I/YR]</td>
<td>10 [I/Y]</td>
</tr>
<tr>
<td>[PV]</td>
<td>[CPT] [PV]</td>
</tr>
</tbody>
</table>

Solution: -614.46 (cost)

4. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required rate of return is 7%?

   a. FF4100  
   b. FF369   
   c. FF713   
   d. **FF1082**

**ANSWER:** d

**SOLUTION:**

\[ PV = (FF90) \times (PVIFA_{7\%, 5}) + (FF1000) \times (PVIF_{7\%, 5}) \]
\[ = (FF90) \times (4.100) + (FF1000) \times (0.713) \]
\[ = FF369 + FF713 = FF1082 \]

5. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required rate of return is 9%?

   a. FF650   
   b. **FF1000**  
   c. FF389   
   d. FF1050

**ANSWER:** b

**SOLUTION:**

\[ PV = (FF90) \times (PVIFA_{9\%, 5}) + (FF1000) \times (PVIF_{9\%, 5}) \]
\[ = (FF90) \times (3.890) + (FF1000) \times (0.650) \]
\[ = FF1000 \]

6. What is an investment worth that promises to return FF90 per year for the next 5 years and an additional FF1,000 in the fifth year if the required annual rate of return is 11%?

   a. **FF926**
b. FF593
c. FF696
d. FF996

ANSWER: a

SOLUTION:

\[
PV = (FF90)(PVIFA_{11\%,5}) + (FF1000)(PVIF_{11\%,5}) \\
= (FF90)(3.696) + (FF1000)(0.593) \\
= FF926
\]

7. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 5 years?

a. FF10,000
b. **FF33,520**
c. FF3,352
d. FF1,000

ANSWER: b

SOLUTION:

\[
PV = (FF10,000)(PVIFA_{15\%,5}) = (FF10,000)(3.352) = FF33,520
\]

8. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 10 years?

a. FF5,019
b. FF10,000
c. **FF50,190**
d. FF5090

ANSWER: c

SOLUTION:

\[
PV = (FF10,000)(PVIFA_{15\%,10}) = (FF10,000)(5.019) = FF50,190
\]

9. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected for 20 years?

a. **FF62,590**
b. FF10,000
c. FF6,259
d. FF69,250

ANSWER: a

SOLUTION:
PV = (FF10,000) (PVIFA_{15\%,20}) = (FF10,000) (6.259) = FF62,590

10. What is an investment worth that promises to return FF10,000 per year, given a required annual rate of return of 15% if the benefits are expected indefinitely into the future?

   a. FF15,000
   b. FF66,667
   c. FF10,000
   d. FF6,667

ANSWER: b

SOLUTION:

PV = FF10,000/0.15 = FF66,667

11. You have the opportunity to purchase a contract that promises to pay the owner of the contract $10,000 per year forever. If your required annual rate of return is 16%, would you purchase this contract if the offering price were $70,000?

   a. Yes, purchase for $70,000
   b. No, do not purchase for $70,000

ANSWER: b

SOLUTION:

PV = $10,000/0.16 = $62,500
Since the contract's PV is only $62,500, you should not be willing to purchase it for $70,000.

12. A company is evaluating an investment that is sensitive to changes in the national economy. If the economy is expanding rapidly, the investment will generate cash flows of $750,000 per year; if there is mild growth, $500,000; if there is a recession, $250,000. The company's staff economists estimate there is a 20% chance that there will be rapid expansion, a 60% chance of mild growth, and a 20% chance of recession. Given this information calculate the expected cash flow and the standard deviation of the cash flows from this proposed investment. What is the coefficient of variation (CV) of the cash flows from this proposed investment?

   a. Coefficient of variation, 0.316
   b. Coefficient of variation, 3.106
   c. Coefficient of variation, 0.158
   d. Coefficient of variation, 0.114

ANSWER: a

SOLUTION:
\[
\hat{k} = \sum_{i=1}^{N} k_i p_i \\
= (750,000) (0.2) + (500,000) (0.6) + (250,000) (0.2) \\
= 500,000 \\
\]

\[
\sigma = \sqrt{\frac{\sum_{i=1}^{N} (k_i - \hat{k})^2 p_i}{N}} \\
= \sqrt{(750,000 - 500,000)^2 (0.2) + (500,000)^2 (0.6) + (250,000 - 500,000)^2 (0.2)} \\
= \sqrt{(250,000)^2 (0.2)} \\
= 158,114 \\
CV = \sigma / \hat{k} = \frac{158,114}{500,000} = 0.316, \text{ or } 0.32
\]

**KEYSTROKES:**

**HP**

A)

750,000 [INPUT] .2 [Σ+] 
500,000 [INPUT] .6 [Σ+] 
250,000 [INPUT] .2 [Σ+] 

[ ' ] [ \bar{X} w ] 
Partial solution: 500,000.00

B)

750,000 [-] 
500,000 [=] 
[ ' ] [X^2] [x] 
.2 [=] [M+] 
250,000 [-] 
500,000 [=] 
[ ' ] [X^2] [x] 
.2 [=] [M+] [RM] [ ' ] [X^-]
Partial solution: 158,113.88

C)

[ ÷ ] 
500,000 [=]

Solution: 
Part A) 500,000 
Part B) 158,113.88 
Part C) .32

**TI**

A)

[2nd] [Data] 
750,000 [ENTER] .2 [ENTER] 
500,000 [ENTER] .6 [ENTER] 
250,000 [ENTER] .2 [ENTER] 

[2nd] [Stat] 
[2nd] [CLR Work] [ ÷ ] [ ÷ ] 
Partial solution (X dash): 500,000.00

B)

750,000 [-] 
500,000 [=] 
[ ' ] [X^2] [x] 
.2 [=] [STO] 1 
250,000 [-] 
500,000 [=] 
[ ' ] [X^2] [x] 
.2 [=] [STO] [ ÷ ] 1 
[RCL] 1 [¹/₃] 
Partial solution: 158,113.88

C)

[ ÷ ] 
500,000 [=]

Solution: 
Part A) 500,000 
Part B) 158,113.88 
Part C) .32

13. The expected rate of return for the stock of Cornhusker Enterprises is 20 percent, with a standard deviation of 15 percent. The expected rate of return for the stock of Mustang Associates is
10 percent, with a standard deviation of 9 percent. Which stock would you consider to be riskier? Why?

a. Cornhusker is riskier
b. Mustang is riskier

ANSWER: b

SOLUTION:

The coefficient of variation of returns for Cornhusker’s stock is 0.75 (15%/20%). The coefficient of variation of returns for Mustang’s stock is 0.90 (9%/10%). Therefore, according to the coefficient of variation criterion (which considers total risk—both systematic and unsystematic), Mustang’s stock is riskier.

14. An investor currently has all of his wealth in Treasury bills. He is considering investing one-third of his funds in Delta Airlines, whose beta is 1.30, with the remainder left in Treasury bills. The expected risk-free rate (Treasury bills) is 6 percent and the market risk premium is 8.8 percent. Determine the beta and the expected return on the proposed portfolio.

a. 0.0; 14%
b. 0.17; 17.44%
c. **0.43; 9.81%**
d. 0.66; 13.4%

ANSWER: c

SOLUTION:

Treasury bills: \( \beta_t = 0.0 \); \( k_t = k_{RF} = 0.06 \)
Delta Airlines: \( \beta_D = 1.3; k_D = 0.06 + (0.088) 1.3 = 0.1744 \) or 17.44%
Portfolio: \( \beta_p = 0.667 (0.0) + 0.333 (1.3) = 0.43 \)
\( k_p = 0.667 (0.06) + 0.333 (0.1744) = 0.0981 \) or 9.81%
or \( k_p = 0.06 + 0.088 (0.4333) = 0.0981 \)

**KEYSTROKES:**

**HP**

[ ' ] [CE]

A) Kj delta:
0.06 [+] [[]]
1.3 [x]
0.088 [ ' ] [] [=]
**Partial solution: .174**

B) E(R) Portfolio:
6 [INPUT] .66 [Σ+]
17.4 [INPUT] .33 [Σ+]
[ ' ] [Σ w]

**TI**

A) Kj delta:
.06 [+] [[]]
1.3 [x]
.088 [] [=]
**Partial solution: .174**

B) E(R) Portfolio:
6 [x]
.667 [+] [[]]
17.4 [x] .333 [] [=]
**Partial solution (X dash): 9.8**

C) Beta of portfolio:
33 [%] [x]
1.3 [=]
15. The stock of Pizza Hot, Inc., a Mexican pizza chain, has an estimated beta of 1.5. Calculate the required rate of return on Pizza Hot's stock if the SML is estimated as follows: 
\[ k_p = 0.06 + 0.088\beta_p \]
based on an initial inflation expectation of 4 percent.

a. 8.8%
   b. **19.2%**
   c. 16.6%
   d. 18.7%

Answer: **b**

Solution:
\[ k_{PH} = 0.06 + 0.088 (1.5) = 0.192 \text{ or } 19.2\% \]

16. The stock of Pizza Hot, Inc., a Mexican pizza chain, has an estimated beta of 1.5. Calculate the required rate of return on Pizza Hot's stock if the SML is estimated as follows: 
\[ k_p = 0.06 + 0.088\beta_p \]
based on a new inflation expectation of 6 percent.

a. 12.2%
   b. 15.8%
   c. **21.2%**
   d. 12.2%

Answer: **c**

Solution:
\[ k_{PH} = 0.08 + 0.088 (1.5) = 0.212 \text{ or } 21.2\% \]
17. The SML has been estimated as follows:
\[ k_j = 0.06 + 0.088 \beta \]
Suppose that the market risk premium \((k_m - k_{RF})\) increases by 1.2 percentage points (i.e., 0.012) as the result of an increase in uncertainty about the future economic outlook. Calculate the required rate of return on Meditek stock (whose estimated beta is 1.25) before and after the change in the market risk premium.

a. 17%; 18.5%
b. 16%; 17.3%
c. 17.3%; 18.9%
d. 18%; 19.2%

ANSWER: a

SOLUTION:

Before: \( k_j = 0.06 + 0.088 (1.25) = 0.17 \) or 17%
After: \( k_j = 0.06 + 0.10 (1.25) = 0.185 \) or 18.5%

KEYSTROKES:

<table>
<thead>
<tr>
<th>HP</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Before:</td>
<td>A) Before:</td>
</tr>
<tr>
<td>.06 [+] ['] [[]]</td>
<td>.06 [+] [[]]</td>
</tr>
<tr>
<td>.088 [x]</td>
<td>.088 [x]</td>
</tr>
<tr>
<td>1.25 ['] []] =</td>
<td>1.25 []] =</td>
</tr>
<tr>
<td>Partial solution: 17</td>
<td>Partial solution: 17</td>
</tr>
<tr>
<td>B) After:</td>
<td>B) After:</td>
</tr>
<tr>
<td>.06 [+] ['] [[]]</td>
<td>.06 [+] [[]]</td>
</tr>
<tr>
<td>.10 [x]</td>
<td>.10 [x]</td>
</tr>
<tr>
<td>1.25 ['] []] =</td>
<td>1.25 []] =</td>
</tr>
<tr>
<td>Partial solution: 18.5</td>
<td>Partial solution: 18.5</td>
</tr>
<tr>
<td>Solution:</td>
<td>Solution:</td>
</tr>
<tr>
<td>Part A) 17</td>
<td>Part A) 17</td>
</tr>
<tr>
<td>Part B) 18.5</td>
<td>Part B) 18.5</td>
</tr>
</tbody>
</table>

18. Suppose a U.S. Treasury bill, maturing in 1 year, can be purchased today for $92,500. Assuming that the security is held until maturity, the investor will receive $100,000 (face amount). Determine the rate of return on this investment.

a. 9.55%
b. 8.11%
c. 7.28%
d. 9.25%

ANSWER: b

SOLUTION:

\[ N = 1 \]
19. Find the beta of a portfolio of three stocks. One third of the portfolio is invested in each of the stocks. The stocks and their betas are as follows: Mallmart, beta 1.10; Peak Power Co., beta 0.85; and Micro Ease, beta 1.40.

   a.  \textbf{1.115}
   b.  1.401
   c.  1.110
   d.  1.853

ANSWER: a

SOLUTION:

\[
\beta_p = (1.10) (0.333) + (0.85) (0.333) + (1.40) (0.333)
\]
\[
= 0.366 + 0.283 + 0.466 = 1.115
\]

20. You have two assets in your investment portfolio: a stock mutual fund with a beta of 1.20 and U.S. treasury securities (assume that they are risk-free). What is the beta of your portfolio if 40% of your funds are invested in the treasury securities?

   a.  0.60
   b.  0.40
   c.  0.81
   d.  \textbf{0.72}

ANSWER: d

SOLUTION:

\[
\beta_p = (0.00) (0.40) + (1.20) (1 -0.40)
\]
\[
= 0.00 + 0.72 = 0.72
\]

21. Given that the required return on the market portfolio is 18.80% and the current risk-free rate of return is 8.3%, calculate the required rates of return on the common stock of three corporations with the following betas: Firm A = 0.10; Firm B = 0.60; and Firm C = 1.20.

   a.  14%; 10.3%; 19.2%
   b.  \textbf{9.35%}; \textbf{14.6%}; \textbf{20.9%}
   c.  8.3%; 18.8%; 12.6%
   d.  12.6%; 21.1%; 14.6%

ANSWER: b

SOLUTION:

\[
lc_j = r_f + (lc_m - r_f)\beta_j
\]
lcA = 0.083 + (0.188 - 0.083) (0.10)
= 0.083 + 0.0105 = 0.0935 = 9.35%
lcB = 0.083 + (0.188 - 0.083) (0.60)
= 0.083 + 0.063 = 0.146 = 14.6%
lcC = 0.083 + (0.188 - 0.083) (1.20)
= 0.083 + 0.126 = 0.209 = 20.9%

22. You have the following information on two securities in which you have invested:

<table>
<thead>
<tr>
<th></th>
<th>Expected Return</th>
<th>Standard Deviation</th>
<th>Security Beta</th>
<th>% Invested (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xerox</td>
<td>15%</td>
<td>4.5%</td>
<td>1.20</td>
<td>35%</td>
</tr>
<tr>
<td>Kodak</td>
<td>12%</td>
<td>3.8%</td>
<td>0.98</td>
<td>65%</td>
</tr>
</tbody>
</table>

What is the expected return on the portfolio? What is the beta of the portfolio?

a. 13.05%; 1.06
b. 14.25%; 1.06
c. 13.25%; 1.21
d. 12.96%; 1.15

ANSWER: a

SOLUTION:

Expected return = \(\hat{k} = 0.35 (15\%) + 0.65 (12\%) = 13.05\%\)
Standard deviation = \(\sigma_p = [ (.35)^2 (4.5\%)^2 + (.65)^2 (3.8\%)^2 + 2 (.35) (.65) (.6) (4.5\%) (3.8\%) ]^{\frac{1}{2}} = 3.64\%\)
Beta: \(\beta_p = 0.35 (1.2) + 0.65 (0.98) = 1.06\)

23. Realizing the benefits of diversification you have invested in the following securities:

<table>
<thead>
<tr>
<th></th>
<th>United</th>
<th>Chubb</th>
<th>Chase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected return</td>
<td>12%</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Standard deviation of return</td>
<td>3%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Beta</td>
<td>1.65</td>
<td>1.2</td>
<td>0.89</td>
</tr>
<tr>
<td>Amount invested in each security</td>
<td>$50,000</td>
<td>$125,000</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

Compute the expected rate of return on the portfolio, and the beta of the portfolio.

a. 13.8%; 1.17
b. 12.1%; 1.20
 c. 12.6%; 1.31
d. 13.1%; 1.29

ANSWER: b

SOLUTION:

\(\hat{k} = 0.2 (12\%) + 0.5 (14\%) + 0.3 (9\%) = 12.1\%\)
Beta: \(\beta_p = 0.2 (1.65) + 0.5 (1.2) + 0.3 (.89) = 1.20\)
24. Macedonia Oil is drilling an offshore oil well. The following table lists the expected cash flow from each possible outcome and, based on geological studies, the probability of each.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Cash Flow</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Well</td>
<td>-$1,000,000</td>
<td>0.30</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1,000,000</td>
<td>0.30</td>
</tr>
<tr>
<td>Gas and Oil</td>
<td>2,000,000</td>
<td>0.20</td>
</tr>
<tr>
<td>Oil</td>
<td>1,000,000</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Each cash flow will occur one year from today and will fully deplete the well. There is a cash outflow for a dry well due to shutdown expenses. Calculate the expected value of the cash flows from the well, and the standard deviation and coefficient of variation of the cash flows.

a. $1,000,000; $600,000; 1.537
b. $766,000; $1,512,250; 1.966
c. **$600,000; $1,113,553; 1.856**
d. $650,000; $1,211,353; 1.812

**ANSWER:** c

**SOLUTION:**

\[
\text{Expected Value (EV)} = \sum \text{Cash Flow} \times \text{Probability} = (-1,000,000)(0.30) + (1,000,000)(0.30) + (2,000,000)(0.20) + (1,000,000)(0.20) = 600,000
\]

Standard deviation:

\[
\sigma = \sqrt{\sum (\text{Cash Flow} - \text{EV})^2 \times \text{Probability}} = \sqrt{(-1,000,000 - 600,000)^2 (0.30) + (1,000,000 - 600,000)^2 (0.30) + (2,000,000 - 600,000)^2 (0.20) + (1,000,000 - 600,000)^2 (0.20)} = 1,113,553
\]

Coefficient of variation:

\[
\text{CV} = \frac{1,113,553}{600,000} = 1.856
\]