1. Consider the following distribution of returns:

Probability	R_A	R_B	R_C
30%	-20%	-5%	5%
40%	5%	10%	3%
30%	40%	15%	2%

What is the expected return of security A? Round off your answer to two digits after the decimal point. State your answer as a percentage rate (such as 5.55)

Answer:

The answer is that $\mathrm{E}(\mathrm{R_A}) = 8\%$.

The expected return is calculated as the probability-weighted average of the returns. P(Ri) is the probability of each scenario and Ri the return in each scenario, where scenarios are labeled by i. So we write the expected return as:

$$E(R) = \sum R_i \cdot P(R_i)$$

$$\mathrm{E}(\mathrm{R_A}) = -20\% \cdot 0.30 + 5\% \cdot 0.40 + 40\% \cdot 0.30 = 8\%$$

2. Consider the following distribution of returns:

Probability	R_A	R_B	R_C
30%	-20%	-5%	5%
40%	5%	10%	3%
30%	40%	15%	2%

What is the expected return of security B? Round off your answer to two digits after the decimal point. State your answer as a percentage rate (such as 5.55)

Answer:

The answer is that $\mathrm{E}(\mathrm{R_B}) = 7$.

The expected return is calculated as the probability-weighted average of the returns. P(Ri) is the probability of each scenario and Ri the return in each scenario, where scenarios are labeled by i. So we write the expected return as:

$$E(R) = \sum R_i \cdot P(R_i)$$

$$\mathrm{E}(\mathrm{R_B}) = -5\% \cdot 0.30 + 10\% \cdot 0.40 + 15\% \cdot 0.30 = 7\%$$

3. Consider the following distribution of returns:

Probability	R_A	R_B	R_C
30%	-20%	-5%	5%
40%	5%	10%	3%
30%	40%	15%	2%

What is the expected return of security C? Round off your answer to two digits after the decimal point. State your answer as a percentage rate (such as 5.55)

Answer:

The answer is that $E(R_C) = 3.3$.

The expected return is calculated as the probability-weighted average of the returns. P(Ri) is the probability of each scenario and Ri the return in each scenario, where scenarios are labeled by i. So we write the expected return as:

$$E(R) = \sum R_i \cdot P(R_i)$$

$$E(R_C) = 5\% \cdot 0.30 + 3\% \cdot 0.40 + 2\% \cdot 0.30 = 3.3\ \%$$

4. Consider the following distribution of returns:

Probability	R_A	R_B	R_C
30%	-20%	-5%	5%
40%	5%	10%	3%
30%	40%	15%	2%

Using your answers for questions 1-3, now compute the expected return of a portfolio with 40% in A, 40% in B, and 20% in C. Round off your answer to two-digits after the decimal point. State your answer as a percentages rate (such as 5.55)

Answer:

The answer is that $E(R_P) = 6.66$.

The expected return of a portfolio is calculated as:

$E(R_p) = \sum w_i \cdot E(R_i)$, where wi are the weights we choose for each investment

Note: $\sum w_i = 1$

In this case we form a portfolio with 40% in A, 40% in B and 20% in C, whereas w_A=40%=0.40, w_B=40%=0.40 and w_C=20%=0.20.

$$E(R_P) = 0.40 \cdot 8\% + 0.40 \cdot 7\% + 0.20 \cdot 3.3\% = 6.66\%$$

5. Consider the following distribution of returns:

Probability	R_A	R_B	R_C
30%	-20%	-5%	5%
40%	5%	10%	3%
30%	40%	15%	2%

Using your answers for questions 1-3, what is the expected return of an equally weighted portfolio? Round off your final answer to two digits after the decimal point. State your answer as a percentage rate (such as 5.55)

Answer:

The answer is that $\mathrm{E(R_P)} = 6.1$.

The expected return of a portfolio is calculated as:

$E(R_p) = \sum w_i \cdot E(R_i)$, where wi are the weights we choose for each investment

Note: $\sum w_i = 1$

In an equally weighted portfolio: $\mathrm{w_A = w_B = w_C} = \frac{1}{3} = 33.33\%$

$$\mathrm{E(R_P)} = \frac{1}{3} \cdot 8\% + \frac{1}{3} \cdot 7\% + \frac{1}{3} \cdot 3.3\% = 6.1\%$$

6. An investor has total wealth of $50,000 and wants to invest in a portfolio with 3 securities A, B, and C with expected returns E(RA) = 20%, E(RB) = 15% and E(RC) =17% respectively. If he chooses to invest $25,000 in security A, $12,500 in security B, and $12,500 in security C, what will be the expected return of this portfolio? State your answer as a percentage rate (such as 5.55)

   Answer:

   The answer is that $\mathrm{E(R_P)} = 18$.

   The expected return of a portfolio is calculated as:

   $E(R_p) = \sum w_i \cdot E(R_i)$, where wi are the weights we choose for each investment

   Note: $\sum w_i = 1$

   We form a portfolio with:

   $\mathrm{w_A} = \frac{25{,}000}{50{,}000} = 0.50$, $\mathrm{w_B} = \frac{12{,}500}{50{,}000} = 0.25$ and $\mathrm{w_C} = \frac{12{,}500}{50{,}000} = 0.25$

   So the expected return of the portfolio would be:

$$\mathrm{E(R_P)} = 0.50 \cdot 20\% + 0.25 \cdot 15\% + 0.25 \cdot 17\% = 18\%$$

7. An investor has total wealth of $50,000 and wants to invest in a portfolio with 3 securities A, B and C with expected returns $E(R_A)$=20%, $E(R_B)$=15% and $E(R_C)$=17% respectively. If he chooses to invest $20,000 to security A, $10,000 to security B and $20,000 to security C, what will be the expected return of this investment option? State your answer as a percentage rate (such as 5.55)

   Answer:

   The answer is that $\mathrm{E}(\mathrm{R_P}) = 17.8$.

   The expected return of a portfolio is calculated as:

   $E(R_p) = \sum w_i \cdot E(R_i)$, where wi are the weights we choose for each investment

   Note: $\sum w_i = 1$

   We form a portfolio with:

   $\mathrm{w_A} = \frac{20{,}000}{50{,}000} = 0.40$, $\mathrm{w_B} = \frac{10{,}000}{50{,}000} = 0.20$ and $\mathrm{w_C} = \frac{20{,}000}{50{,}000} = 0.40$

   So the expected return of the portfolio would be:

   $$\mathrm{E}(\mathrm{R_P}) = 0.40 \cdot 20\% + 0.20 \cdot 15\% + 0.40 \cdot 17\% = 17.8\%$$

8. Suppose your investment budget is $300,000. In addition, you borrow an additional $120,000 investing the total available funds in equities. If the expected rate of return in equities is 8%, and you borrow at 5%, what is your expected portfolio return?

   a. 18.2%
   b. 1.4%
   c. 9.2%
   d. 3%

   Answer:

   The correct answer is c.

   Think about each asset's weight in the total portfolio. Essentially you are creating a levered position in equities financed in part by borrowing.

   The weight in equities = (420,000/300,000) = 140%

   The weight in the short (borrowing position) = -40%

   Expected portfolio return = 1.40 x 8% + (-0.40) x 5% = 9.2%