

1. If your holding period return on a \$100 investment was 12% at the end of the first year, -10% at the end of the second year and 5% at the end of the third year, what was your three year holding period return?
- 4.45%
 - 4.8%
 - 5.84%**
 - 6%
 - 7%

The three-year holding period return is computed as $[(1 + r_1) \times (1 + r_2) \times (1 + r_3)] - 1$.

$$3 \text{ year return} = (1 + 12\%) \times (1 - 10\%) \times (1 + 5\%) - 1 = 5.84\%$$

2. Suppose the probabilities of a recession, a boom and no change in the current economic environment are 40%, 30 %, and 30 % respectively. Also suppose you will have an annual return on your investments of 10% in a recession, 40% in a boom and 20 % if there is no change. What is your expected annual return on your investment?
- 19%
 - 20%
 - 21%
 - 22%**
 - 23%

$$\text{Expected return} = 0.4 * 10 + 0.3*40 + 0.3*20 = 22\%$$

3. You bought a stock of company Alpha and held it over a five-year period. The annual returns of the stock are given by the following table. Based on those we have calculated the gross yearly returns. Is it true that the calculations are correct or is it false?

Year	Return= r	Gross return
1	-10%	0.9
2	-20%	0.8
3	30%	1.3
4	20%	1.2
5	15%	1.15

Answer: It is True.

We just add 1 to each return given in the table. So the gross return should be equal to $1+r$.

4. What is the geometric mean return of the stock over 5 years?

- a. 4.23%
- b. 5.25%
- c. 25%
- d. 30%
- e. 35%

$$(1 + r_g) = [(1 + r_1)(1 + r_1)(1 + r_2) \dots (1 + r_T)]^{\frac{1}{T}} \Rightarrow$$

$$1 + r_g = [(0.9) * (0.8) * (1.3) * (1.2) * (1.15)]^{\frac{1}{5}} = 1.0525. \text{ So } r_g = 5.25\%.$$

5. What is the arithmetic mean return of the stock over five years?

- a. 7%
- b. 5.24%
- c. 7.5%
- d. 9%
- e. 35%

$$r_a = \frac{-10 - 20 + 30 + 20 + 15}{5} = 7\%$$

6. Suppose the probabilities of a recession, a boom and no change in the current economic environment are 40%, 30 %, and 30 % respectively. Also suppose you will have an annual return on your investments of 10% in a recession, 40% in a boom and 20 % if there is no change. What is the standard deviation of your annual return on your investment?

- a. 6.48
- b. 9.50
- c. 12.49
- d. 13.50
- e. 14.28

$$\text{Expected return} = 0.4 * 10 + 0.3 * 40 + 0.3 * 20 = 22\%$$

$$\text{Variance} = 0.4 * (10 - 22)^2 + 0.3 * (40 - 22)^2 + 0.3 * (20 - 22)^2 = 156$$

$$\text{Stand.Dev} = (\text{variance})^{\frac{1}{2}} = 12.49$$

7. An analyst's forecast of the end of year prices and dividend payout of company XYZ under various states of the economy are given by the following table:

State of the economy	Probability	Year-end price	Cash dividends
Crash	0.25	160	5
Poor	0.40	150	10
Good	0.30	160	20
Excellent	0.05	200	30

Suppose you purchased one share for \$160. Which scenario would provide you with the second highest return?

The correct answer that the good scenario provides us with the second highest return (12.5%).

$$\% \text{ Return} = \frac{\text{Capital gain} + \text{Dividend}}{\text{Purchase price}} * 100 ;$$

$$\text{Under "crash" we have } \frac{160 - 160 + 5}{160} * 100 = -3.125\%.$$

$$\text{Under "poor" we have } \frac{150 - 160 + 10}{160} * 100 = 0.00\%.$$

$$\text{Under "good" we have } \frac{160 - 160 + 20}{160} * 100 = 12.50\%.$$

$$\text{Under "excellent" we have } \frac{200 - 160 + 30}{160} * 100 = 43.75\%.$$

8. Again, assuming that you bought one share of stock for \$160, what is the expected annual return for this stock?

State of the economy	Probability	Year-end price	Cash dividends
Crash	0.25	160	5
Poor	0.40	150	10
Good	0.30	160	20
Excellent	0.05	200	30

Recall the expected return is the probability weighted average of the possible return outcomes. The rate of return you earn on your investment in each scenario is computed as
 Rate of return = (capital gain + dividend)/purchase price.

$$\text{Expected return} = 0.25 \times 3.125\% + 0.4 \times 0\% + 0.3 \times 12.5\% + 0.05 \times 43.75\% = 6.72\%$$

9. A volatility strategy is:
- An investment strategy that collects a premium during stable periods, but has large losses during volatile times**
 - An investment strategy that consists in diversifying a securities portfolio
 - None of the above

The correct answer is a.

10. Suppose you have \$100,000 to invest. Investing in equities will generate a gain of \$50,000 with a probability of 60%, or a loss of \$30,000 with a probability of 40%. Investing in the risk-free U.S. Treasury bills on the other hand will generate a sure gain of \$5000. Based on this data, what is the expected risk premium associated with investing in risky equities versus risk-free T-bills?
- 18%
 - 13%**
 - 5%
 - 12%

The expected risk premium associated with investing in risky equities versus risk-free Treasury bills is the expected return on equities minus the rate of return in Treasuries.

The expected rate of return in equities = $50\% \times 0.6 + -30\% \times 0.4 = 18\%$

The rate of return offered by Treasuries is 5%.

The risk premium is therefore $18\% - 5\% = 13\%$