

**Exercise 1.** An investor purchased 125 shares of a stock for \$27.90 per share at the beginning of the quarter. The investor sold all of the shares for \$23.45 per share after receiving a \$36.73 dividend payment at the end of the quarter. Calculate the holding period return.

**Exercise 2.** Given the following information for New Orleans stock, determine the annual realized return for 2017. Specify the dividend yield and capital gain (or loss) for each period.

Date	Price	Dividend
January 1st, 2017	125.14	
March 31st, 2017	117.81	6.78
June 30th, 2017	116.92	6.26
September 30th, 2017	131.48	5.34
December 31st, 2017	145.90	6.12

**Exercise 3.** For the annual returns for Bay Corporation stock provided in the following table, calculate the variance and the standard deviation.

Year	Return (%)
2014	-13.15
2015	7.89
2016	12.90
2017	6.78
2018	-2.35
2019	17.28

**Exercise 4.** An investor evaluating the returns of three recently formed exchange-traded funds gathers the following information:

EFT	Time since inception	Return since inception
1	123 days	4.61%
2	7 weeks	1.10%
3	18 months	14.35%

Calculate the annualized rate of return.

**Exercise 5.** A portfolio manager creates the following portfolio:

Security	Weight	Standard Deviation	Expected Return
1	60%	18%	28%

2	40%	10%	13%
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The correlation of returns between the two securities is 0.30. Calculate the expected return and the standard deviation of the portfolio.

**Exercise 6.** A portfolio manager creates the following portfolio:

Security	Weight	Standard Deviation	Expected Return
1	25%	22%	31%
2	75%	14%	16%

The correlation of returns between the two securities is -0.0283. Calculate the expected return and the standard deviation of the portfolio.

**Exercise 7.** A portfolio manager creates the following portfolio:

Security	Weight	Standard Deviation
1	30%	20%
2	70%	12%

The standard deviation of the portfolio is 14.40%. Calculate the covariance and the correlation between the two securities.

**Exercise 8.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

State of nature	Probability	X's Return	Y's Return
Recession (bad)	30%	-10%	10%
Normality (regular)	40%	20%	10%
Prosperity (good)	30%	50%	10%

- Compute the expected return, standard deviation and correlation coefficient for both assets.
- Compute the weights for the global minimum-variance two-asset portfolio.
- Compute the return and risk of an equal-weighted two-asset portfolio (S).
- Which portfolio will an absolutely averse individual invest in?

- e) An efficient investor wants to assume a standard deviation risk of 0.75 by building a two-asset portfolio (P). Which percentage of the budget will be invested in each asset?
- f) Is a portfolio (K) short selling X 20% of the investor's budget efficient?
- g) How much risk does a portfolio (L) with zero expected return have?

**Exercise 9.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

State of nature	Probability	X's Return	Y's Return
I	60%	25%	15%
II	40%	10%	11%

Calculate the expected return, standard deviation and correlation coefficient for both assets.

- a) Compute the weights for the global minimum-variance two-asset portfolio. What are its expected return and standard deviation?
- b) What will the return of portfolio P be where 60% of the budget is invested in asset X and the maximum risk assumed is  $\sigma_P = 5.192918\%$ ? Is portfolio P efficient?
- c) What will the risk (standard deviation) of portfolio K be where 90% of the budget is invested in asset Y and the expected return is 13.96%?
- d) What is the expected return and risk (standard deviation) of portfolio Q where 120% of the budget is invested in asset Y? Is portfolio Q efficient?
- e) Draw an expected return-standard deviation diagram indicating single assets and portfolios.

**Exercise 10.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

State of nature	Probability	X's Return	Y's Return
I	60%	20%	5%
II	40%	10%	8%

- a) Compute expected returns, standard deviations and correlation coefficient for both assets.
- b) Compute the weights for the global minimum-variance two-asset portfolio. What is its expected return and standard deviation?
- c) What will be the return of portfolio P, which has a  $\sigma_P = 2.35151\%$ ? Is portfolio P efficient?
- d) What will be the risk (standard deviation) of portfolio K with expected return equal to 7.18%? Is portfolio K efficient?

- e) What is the expected return and risk (standard deviation) of portfolio Q, where 120% of the budget is invested in asset Y? Is portfolio Q efficient?
- f) Draw an expected return-standard deviation diagram indicating single assets and portfolio.

**Exercise 11.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

State of nature	Probability	X's Return	Y's Return
I	20%	18%	2%
II	20%	20%	8%
III	20%	22%	5%
IV	20%	15%	3%
V	20%	10%	11%

- a) Compute the expected return, standard deviation and correlation coefficient for both assets.
- b) Compute the weights for the global minimum-variance two-asset portfolio. What are its expected return and standard deviation?
- c) What will be the return of portfolio P, which has a  $\sigma_P = 2.24\%$ ? Is portfolio P efficient?
- d) What will the risk (standard deviation) of portfolio K be where 90% of the budget is invested in asset Y and the expected return is 6.92%? Is portfolio K efficient?
- e) What is the expected return and risk (standard deviation) of portfolio Q, where 120% of the budget is invested in asset Y? Is portfolio Q efficient?
- f) Draw an expected return-standard deviation diagram indicating single assets and portfolios.

**Exercise 12.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

State of nature	Probability	X's Return	Y's Return
I	30%	-10%	10%
II	40%	20%	10%
III	30%	50%	10%

- a) Compute the expected return, standard deviation and correlation coefficient for both assets.
- b) Compute the weights for the global minimum-variance two-asset portfolio. What are

its expected return and standard deviation?

- c) What will be the return of portfolio P, which has a  $\sigma_P = 13.94274\%$ ? Is portfolio P efficient?
- d) What will be the risk (standard deviation) of portfolio K, where 90% of the budget is invested in asset Y and the expected return is 11%? Is portfolio K efficient?
- e) What is the expected return and risk (standard deviation) of portfolio Q, where 120% of the budget is invested in asset Y? Is portfolio Q efficient?
- f) Draw an expected return-standard deviation diagram indicating single assets and portfolios.

**Exercise 13.** Consider two financial assets, X and Y, traded isolated or as part of a portfolio. All investors take decisions according to mean-variance analysis. Historic return information is available at no cost for everybody. The following estimates are computed with that information.

Asset	Expected Return	Standard Deviation
X	17.60%	7.00%
Y	3.00%	3.60%

- a) What will be the expected return and risk (standard deviation) of the global minimum-variance two-asset portfolio if the linear correlation is perfectly negative?
- b) What will be the expected return and risk (standard deviation) of the global minimum-variance two-asset portfolio if the linear correlation is -0.5?
- c) What will be the expected return and risk (standard deviation) of the global minimum-variance two-asset portfolio if the linear correlation is perfectly positive?
- d) Design a portfolio for an investor who would like to obtain an expected return of 12%. What is its risk (standard deviation) if  $\rho_{XY} = -1$ ,  $\rho_{XY} = -0.5$  and  $\rho_{XY} = 1$ ? Which case is best?
- e) Draw an expected return-standard deviation diagram indicating single assets and portfolios.
- f) If  $E(R) = 12\%$ , for which value of  $\rho_{XY}$  is the portfolio risk (standard deviation) equal to the weighted average of the risk (standard deviation) of the single assets?
- g) If an investor would like to assume a risk (standard deviation) of 4%, design a portfolio if  $\rho_{XY} = -1$ ,  $\rho_{XY} = -0.5$  and  $\rho_{XY} = 1$ . Which case is best?