

EC 247 Financial Instruments and Capital Markets

Class Exercise 9 Solutions

These questions are chosen from chapters 20, 21 and 22 of the Frederic S. Mishkin and Stanley G. Eakins, *Financial Markets and Institutions*, 7th Edition, Pearson Prentice Hall, 2012.

The first three questions have to do with the way that the Net Asset Value (NAV) associated with a mutual fund is calculated. Mutual funds pool the resources of many small investors by selling them shares and use the proceeds in order to invest in a well diversified portfolio of securities, which is actively managed by the manager of the mutual fund. The *value* or *price* of each share is called NAV and is equal to the market value of the portfolio minus any liabilities, divided by the number of shares outstanding. Some critical issues related to the NAV calculation can be summarized as follows:

- The NAV of the fund will change (increase or decrease) due to changes in the prices of the securities that comprise the portfolio.
- The number of shares in the fund will change, (increase or decrease) due to deposits or withdrawals from the fund.
- The total value of the fund will increase or decrease for both reasons mentioned above.

These aspects are explicitly addressed in the first three questions.

Question 1

On January 1st, a mutual fund has the following assets and prices at 4:00 p.m.:

Stock	Shares owned	Price
1	1,000	\$ 1.97
2	5,000	\$48.26
3	1,000	\$26.44
4	10,000	\$67.49
5	3,000	\$ 2.59

Calculate the net asset value (NAV) for the fund. Assume that 8,000 shares are outstanding for the fund.

In this question we apply directly the formula for calculating the NAV. It is assumed that liabilities are zero and that there are 8,000 shares outstanding. What we have to calculate is the total value of the market portfolio. Given the table above we can multiply the shares owned with the relevant price associated with each stock, and add them together. As a result, the market price of the portfolio is given as follows:

$$NAV = \frac{(1,000 * \$1.97) + (5,000 * \$48.26) + (1,000 * \$26.44) + (10,000 * \$67.49) + (3,000 * \$2.59)}{8,000}$$

$$NAV = \frac{\$1,970 + \$241,300 + \$26,440 + \$674,900 + \$7,770}{8,000}$$

$$NAV = \frac{\$952,380}{8,000} = \$119.05 / share$$

Question 2

An investor sends the fund a check for \$50,000. If there is no front-end load, calculate the new number of shares and price/share. Assume the manager purchases 1,800 shares of stock 3, and the rest is held as cash.

In this question an investor sends to the fund a check for \$50,000. It is assumed that the manager invests part of this amount in purchasing 1,800 shares of stock 3 at a price of \$26.44 (so he invests \$47,592) and that the rest of \$2,408 is held in cash. One crucial aspect is that new investments into the fund (or withdrawals from the fund) during a day are priced at the closing NAV. This means that 420 new shares were issued for the \$50,000 deposited into the fund. So, at the end of the day there will be 8,420 shares outstanding and the total value of the fund will be \$952,380+\$50,000 = \$1,002,380. That means that the net asset value of the fund will be:

$$NAV = \frac{\$1,002,380}{8,420} = \$119.05 / share$$

The new fund looks like:

Stock	Shares owned	Price
1	1,000	\$ 1.97
2	5,000	\$48.26
3	2,800	\$26.44
4	10,000	\$67.49
5	3,000	\$ 2.59
cash	n.a.	\$ 2408

Question 3

On January 2nd, the prices at 4:00 pm are:

Stock	Shares owned	Price
1	1,000	\$ 2.03
2	5,000	\$51.37
3	2,800	\$29.08
4	10,000	\$67.19
5	3,000	\$ 4.42
cash	n.a.	\$ 2408

Calculate the net asset value (NAV) for the fund

In this question the prices of the securities that comprise the portfolio have changed. Given the new prices the NAV is calculated as follows.

$$NAV = \frac{\$2,030 + \$256,850 + \$81,424 + \$671,900 + \$13,260 + \$2,408}{8,420} = \$122.08 / share$$

Question 4

An employee contributes \$200 a year (at the end of the year) to her pension plan. What would be the total contributions and value of the account after 5 years? Assume that the plan earns 15% per year over the period

In this question we have an investor that contributes \$200 per year (at the end of the year) into her pension plan. In order to find the future value of the plan after 5 years, we have to compound the \$200 paid every year at a rate of 15% per year over the 5-year period. Consequently, the future value of the plan (FV) will be:

$$FV = \$200(1 + 0.15)^4 + \$200(1 + 0.15)^3 + \$200(1 + 0.15)^2 + \$200(1 + 0.15)^1 + \$200 = \$1,348.47$$

The total contributions will be: $(\$200 * 5) = \1000 .

Question 5

The limit order book for a security is:

Unfilled Limit Orders			
Buy	Orders	Sell	Orders
25.12	100	25.36	300
25.20	500	25.38	200
25.23	200	25.41	200

The specialist receives the following, in order:

- Market order to sell 300 shares
- Limit order to buy 100 shares at 25.38
- Limit order to buy 500 shares at 25.30

How, if at all, are these orders filled? What does the limit order book look like after these orders?

The buy orders under the unfilled limit order book reflect the highest prices that investors are willing to pay in order to buy the stock. On the other hand, the sell orders under the limit order book represent the lowest prices that investors holding the share are willing to accept in order to sell. Currently no transactions occur because no one is willing to sell at a price anyone is willing to pay.

The specialist then receives the following orders:

- A market order to sell 300 shares (at the best available price). The specialist will consult the book (the buy orders column) and fulfill the order accordingly:

200 shares at 25.23 and 100 shares at 25.20

- The specialist then receives a limit order to buy 100 shares at 25.38. This is the maximum price that the investor is willing to pay in order to purchase the stock. The specialist will consult the limit order book (the sell order column this time) and fulfill the order accordingly:

100 shares at 25.36

- Finally, the specialist receives a limit order to buy 500 shares at 25.30. Since there is no sell order for this amount the order is added to the book.

After these, the book looks like:

Unfilled Limit Orders			
Buy	Orders	Sell	Orders
25.12	100	25.36	200
25.20	400	25.38	200
25.30	500	25.41	200