EXERCISES -4 (SOLUTIONS)

1. When interest rate is 4% the price of the bond is equal to:

$$PV = 60 \times \left[\frac{1}{0.04} - \frac{1}{0.04 \times (1.04)^5} \right] + \frac{1,000}{(1.04)^5} = 1,089.04$$

If the interest rate is 3% the price is equal to:

$$PV = 60 \times \left[\frac{1}{0.03} - \frac{1}{0.03 \times (1.03)^5} \right] + \frac{1,000}{(1.03)^5} = 1,137.39$$

We observe that a decrease in the interest rate causes an increase in the bond price.

2.

a. Since the bond is sold at the face value the yield to maturity is equal the coupon rate. The duration is calculated as using the Excel function DURATION and it is equal to 7.51.

b. The duration rule imply that:

$$\frac{\Delta P}{P} = -D^* \Delta y = -\frac{D}{1+y} \Delta y = -\frac{7.51}{1.07} 0.01 = -0.07$$

Thus, the duration rule predicts a 7% decrease in the bond price.

3.

a.

$$P_A = \frac{50}{1.05} + \frac{1,050}{1.054^2} = \$992.79$$

$$P_B = \frac{50}{1.05} + \frac{50}{1.054^2} + \frac{50}{1.057^3} + \frac{50}{1.059^4} + \frac{1,050}{1.06^5} = \$959.34$$

$$P_C = \frac{100}{1.05} + \frac{100}{1.054^2} + \frac{100}{1.057^3} + \frac{100}{1.059^4} + \frac{1,100}{1.06^5} = \$1,171.43$$

b. Using the Excel function YIELD we find that the yield to maturity of the 5% 5-year bond id 5.96%, and the yield of the 10% 5-year bond is 5.93%. The yield depends upon both the coupon payment and the spot rate at the time of the coupon payment. The 10% bond has a slightly greater proportion of its total payments coming earlier, when interest rates are low, compared to the 5% bond. Thus the yield of the 10% bond is slightly lower.

c. The yield of a 5-year zero-coupon bond should be 6%.

4. For company X we have that EBITA/Assets = 150/1,600 = 9.4%, EBITA/Interests = 150/25 = 6 and Debt/Assets = 700/1,600 = 44%. These numbers correspond to a firm with a Baa rating. For company Y we have that EBITA/Assets = 70/1,200 = 5.8%, EBITA/Interests = 70/35 = 2 and Debt/Assets = 800/1,200 = 67%. These numbers correspond to a firm with a B rating. Therefore, company X is considered safer than company Y.