**Problem 1.** A one-year discount bond is promising to pay 1,357 dollars next year. Wolfgang requires an 18% rate of return from this bond. In other words, Wolfgang is willing to pay not a penny more than _____ dollars for this bond.

**Answer 1.** In other words, if he pays $x$ dollars today for a bond that has an interest rate of 18%, then he will receive 1357 dollars one years from now. In the maths,

$$\begin{aligned} & P \times 1.18 = 1357 \\ \implies & P = 1150. \end{aligned}$$

If he pays less than 1150 today and receives 1357 dollars one years from now, then his interest rate will be greater than 18%.

**Problem 2.** *True or False.* Asset A is riskier than asset B. Therefore, investors will require a higher rate of return from Asset A than Asset B. As a result, the price of Asset A will be higher than the price of Asset B.

**Answer 2.** *False.* A riskier asset, all else equal, will require a higher rate of return (otherwise no one would buy it). Therefore we need A to have a higher return. A higher rate of return comes when the price of the asset is cheaper, so the price of A should be cheaper than the price of B.

That last point is kinda counter-intuitive on the face of it. But the return on the bond is

$$\text{Return} = \text{Future Payout} - \text{Asset Price}.$$

So a lower price means you're subtracting less and thus getting a higher return.

**Problem 3.** Asset A is expected to pay out 1,500 dollars next year and is selling for 1,250 dollars today. This asset is quite risky and carries a risk premium of 15% over a one-year Treasury discount bond that has a face value of 2,520 dollars. What is the price of this Treasury discount bond today?

**Answer 3.** We first want to find the interest rate on Asset A. It involves the equation

$$1250 \times (1 + R) = 1500 \implies i = 20\%.$$

We are told that this asset has a risk premium of 15% over the bond, so the bond has an interest rate of $20 - 15 = 5\%$. Let $P$ be the price of the bond today. Therefore

$$P \times 1.05 = 2520 \implies P = 2400.$$

**Problem 4.** Bond A and Bond B are exactly identical in terms of risk, liquidity, and any other attribute. For example, they are two one-year bonds issued by the same corporation. Bond A is expected to pay \$1,403 next year and Bond B is expected to pay \$168,360 next year. Which of the following pairs of prices are consistent with the attributes of these two bonds?

**(a)** Price of Asset A = \$1,155 & Price of Asset B = \$138,500

**(b)** Price of Asset A = \$1,150 & Price of Asset B = \$138,000

**(c)** Price of Asset A = \$1,170 & Price of Asset B = \$134,000

**(d)** Price of Asset A = \$1,160 & Price of Asset B = \$140,000

**Answer 4: (b).** For Bond A, we have

$$1150 \times (1 + R) = 1403 \implies R = 22\%.$$

With this interest rate, Bond B says

$$138000 \times 1.22 \approx 168360.$$

So the two are consistent.

**Problem 5.** A corporation's discount bond promises to pay \$1,150 next year and is selling for \$1,000 in the bond market today. The same corporation wants to issue another identical discount bond that promises to pay \$2,300 next year. This second bond's price in the market will equal _____ dollars.

**Answer 5.** The first bond satisfies the equation

$$1000 \times (1 + R) = 1150 \implies R = 15\%.$$

Therefore the second bond must satisfy

$$P \times (1.15) = 2300 \implies P = 2000.$$

**Problem 6.** A U.S. Treasury discount bond has a face value of \$1,050 and is selling for \$1,000 in the bond market today. A corporation issues an identical discount bond with the same face value. The risk premium on the corporation bond is 20 percent. The market value of the corporation bond is _____ dollars.

**Answer 6.** The Treasury bond satisfies the equation

$$1000 \times (1 + R) = 1050 \implies R = 5\%.$$

Since the risk premium is 20%, that means the corporation must offer $5 + 20 = 25\%$ interest on their bonds. Which means for a face value bond of 1050, the corporation must satisfy

$$P \times (1.25) = 1050 \implies P = 840.$$

**Problem 7.** Asset A is more liquid than Asset B. Then, all else the same, the expected rate of return on Asset A will be higher than that on Asset B.

**Answer 7.** *False.* Liquidity is a positive attribute, and in general, any asset with a more positive attribute will have lower return. A is more liquid, so the return on A should be less than that of the relatively illiquid B.

**Problem 8.** A corporation's stock promises to pay a dividend of \$5 next year and investors expect the price of this stock next year to be \$31. Because of the risk associated with this stock, investors require a rate of return of 20 percent from it. The price of this stock in the stock market is _____ dollars.

**Answer 8.** The expected payout from this corporation's stock is

$$\text{dividend} + \text{future stock price} \implies 5 + 31 = 36.$$

We are told that the return must be 20%, therefore

$$\begin{aligned} & \text{Return} = \text{Future Payout} - \text{Asset Price} \\ \implies & 0.20P = 36 - P \\ \implies & P = 30. \end{aligned}$$

**Problem 9.** There are two assets in the market. They both promise to pay \$1,120 next year. Asset A is less risky and carries a rate of return of 12 percent. The risk premium on Asset B is 16 percent. Find

**(a)** Price of Asset A = _____ dollars

**(b)** Price of Asset B = _____ dollars.

**Answer 9.** The two equations we want are

$$P_A \times 1.12 = 1120 \implies P_A = 1000,$$
$$P_B \times 1.28 = 1120 \implies P_B = 875.$$

**Problem 10.** There are three bonds, all promising to pay \$1,386 next year. The following are the interest rates on these bonds:

- Bond A: 5 percent
- Bond B: 10 percent
- Bond C: 20 percent

The following are the prices of these three bonds:

- Price of Bond A: _____ dollars
- Price of Bond B: _____ dollars
- Price of Bond C: _____ dollars

**Answer 10.** The three equations we want are

$$\begin{aligned} P_A \times 1.05 = 1120 &\implies P_A = 1320, \\ P_B \times 1.10 = 1120 &\implies P_B = 1260. \\ P_C \times 1.20 = 1120 &\implies P_B = 1155. \end{aligned}$$