

QTM 385: Homework 1

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Due 2023/02/12 11:59pm

Instructions The homework must be submitted in one pdf file. Everyone needs to make a submission on Canvas. Please write the names of all group members in the homework submission and in the file name, for example, “QTM385 HW1 (xxxx, xxxx)”. Please make sure everyone in the group submits the same file and everyone in a group will receive the same grade. There are 100 points in total in this homework.

Problem 1 [16pts]

Lanni Products is a start-up computer software development firm. It currently owns computer equipment worth \$30,000 and has cash on hand of \$20,000 contributed by Lanni’s owners. For each of the following transactions, identify the real and/or financial assets that trade hands. Are any financial assets created or destroyed in the transaction?

- (a) [4pts] Lanni takes out a bank loan. It receives \$50,000 in cash and signs a note promising to pay back the loan over 3 years.
- (b) [4pts] Lanni uses the cash from the bank plus \$20,000 of its own funds to finance the development of new financial planning software.
- (c) [4pts] Lanni sells the software product to Microsoft, which will market it to the public under the Microsoft name. Lanni accepts payment in the form of 1,250 shares of Microsoft stock.
- (d) [4pts] Lanni sells the shares of stock for \$100 per share and uses part of the proceeds to pay off the bank loan.

Problem 2 [16pts]

Find the equivalent taxable yield of a short-term municipal bond with a yield of 3% for tax brackets of

- (a) [3pts] zero
- (b) [3pts] 10%
- (c) [3pts] 20%

(d) [3pts] 40%

Why are high-tax-bracket investors more inclined to invest in municipal bonds than low-bracket investors? [4pts]

Problem 3 [12pts]

Looking at the Treasury bond maturing in Feb 2036 at the \$1,000 par value in Figure 1

- (a) [3pts] How much would you have to pay to purchase one of these bonds?
- (b) [3pts] How much would you get to sell one of these bonds?
- (c) [3pts] What was its ask price the previous day?
- (d) [3pts] What is its coupon rate? If the bond makes semiannual coupon payments, then how much would you get in each coupon payment?

| LISTING OF TREASURY ISSUES | | | | | ASKED YIELD TO MATURITY |
|----------------------------|--------|----------|----------|--------|-------------------------------|
| MATURITY | COUPON | BID | ASKED | CHANGE | |
| 15-Feb-2019 | 2.750 | 100.0391 | 100.0547 | 0.0078 | 2.256 |
| 30-Apr-2021 | 2.250 | 99.7500 | 99.7656 | 0.2344 | 2.354 |
| 15-May-2023 | 1.750 | 97.4531 | 97.4688 | 0.4766 | 2.364 |
| 15-Aug-2029 | 6.125 | 132.7266 | 132.7891 | 1.1406 | 2.575 |
| 15-Feb-2036 | 4.500 | 125.4688 | 125.5313 | 1.5391 | 2.637 |
| 15-Aug-2048 | 3.000 | 101.8984 | 101.9297 | 1.5391 | 2.902 |

Figure 1: BID, ASKED and CHANGE columns are quoted as a percentage of par.

Problem 4 [16pts]

Looking at the listing for Hess Midstream Partners in Figure 2

- (a) [4pts] How many shares could you buy for \$1,000? Truncate the number of shares to an integer.
- (b) [4pts] What would be your annual dividend income from those shares?
- (c) [4pts] What must be Hess Midstream Partners' earnings per share?
- (d) [4pts] What was the firm's closing price on the day before the listing?

| NAME | SYMBOL | CLOSE | NET CHG | VOLUME | 52 WK HIGH | 52 WK LOW | DIV | YIELD | P/E | YTD %CHG |
|-------------------------------|--------|--------|---------|------------|------------|-----------|------|-------|-------|----------|
| Herbalife Nutrition | HLF | 57.94 | -1.39 | 1,149,773 | 60.41 | 34.16 | 1.20 | 2.07 | 47.75 | -1.71 |
| Herc Holdings | HRI | 26.86 | -0.71 | 389,826 | 72.99 | 24.16 | | | 3.10 | 3.35 |
| Heritage Insurance Holdings | HRTG | 14.57 | -0.38 | 81,929 | 19.15 | 12.85 | 0.24 | 1.65 | 22.01 | -1.02 |
| Hersha Hospitality Trust Cl A | HT | 16.59 | -0.16 | 732,879 | 24.16 | 16.50 | 1.12 | 6.75 | ...dd | -5.42 |
| Hershey | HSY | 106.24 | 0.80 | 1,145,889 | 114.63 | 89.10 | 2.89 | 2.72 | 22.00 | -0.88 |
| Hertz Global Holdings | HTZ | 13.27 | -0.77 | 2,965,201 | 25.14 | 13.01 | | | 2.24 | -2.78 |
| Hess Corp. | HES | 42.39 | 0.15 | 5,969,511 | 74.81 | 35.59 | 1.00 | 2.36 | ...dd | 4.67 |
| Hess Midstream Partners | HESM | 17.87 | 0.25 | 47,899 | 24.51 | 16.17 | 1.43 | 8.00 | 14.60 | 5.24 |
| Hewlett Packard Enterprise | HPE | 13.18 | -0.28 | 11,756,695 | 19.48 | 12.09 | 0.45 | 3.41 | 11.46 | -0.23 |

Figure 2: Listing of stocks traded on the New York Stock Exchange.

Problem 5 [25pts]

Consider the three stocks in the following table. P_t represents price at time t , and Q_t represents shares outstanding at time t . Stock Z splits two for one in the last period.

| | P_0 | Q_0 | P_1 | Q_1 | P_2 | Q_2 |
|-----|-------|-------|-------|-------|-------|-------|
| X | 100 | 200 | 95 | 200 | 95 | 200 |
| Y | 200 | 100 | 220 | 100 | 220 | 100 |
| Z | 180 | 200 | 200 | 200 | 100 | 400 |

- [5pts] Calculate the rate of return on a price-weighted index of the three stocks for the first period ($t = 0$ to $t = 1$).
- [5pts] What must happen to the divisor for the price-weighted index in year 2?
- [5pts] Calculate the rate of return for the second period ($t = 1$ to $t = 2$).

Calculate the first-period rates of return on the following indexes of the three stocks:

- [5pts] A market-value-weighted index.
- [5pts] An equally weighted index.

Problem 6 [15pts]

Suppose you buy a February 2023 expiration Apple call option with an exercise price \$135.

- [5pts] Suppose the stock price in September is \$140. Will you exercise your call? What is the profit of your position? You can ignore the price of the call.
- [5pts] What if you had bought the February 2023 call with exercise price \$145?
- [5pts] What if you had bought a February 2023 put with exercise price \$145?