

Summer 2016: Midterm A

Name Key

Note: Problem 5 is on the second page.

Short Answer (15 points each)

1. General Mills stock has a bid price of \$71.17 and an ask price of \$71.18. If you submit a market order to buy 200 shares of General Mills stock, what will it cost you to buy the shares?

$$200 \times 71.18$$

*+1* *+14*

2. What is one advantage of organizing a business as a corporation?

*+15* one of: limited liability for owners; no limit on # of shares or who can own; easier to raise capital; separation of ownership & management

3. Assume you have short-sold shares of Google parent Alphabet (which pays no dividends). What will lead to a profit on your short-sale?

*+15* price drops

4. You are planning to invest \$3072 into an account so that you can withdraw \$500 a year for 10 years beginning a year from today. Just before you deposit the \$3072, the interest rate on the account changes and you discover that you ~~only need to~~ deposit \$3150 in the account. Which direction have interest rates changed?

*+15* fallen

5. You own a 10% coupon bond that matures 5 years from today and a zero-coupon bond that matures 20 years from today. If the yield to maturity on both bonds falls by 1%, which bond will change in price the most?

*+15* zero-coupon maturing in 20 years

## Problems (75 points each)

Note: Unless I specifically state "calculations required", you can just set up all problems and tell me what you are solving for in each step. If you are using the result of an unsolved equation in a later step, just make that clear. One way to do this, set up the equation and call your result "A" or "B", etc. If you prefer, you can solve everything.

1. Assume you are thinking about buying bonds issued by Wal-Mart and want to determine whether Wal-Mart's debt is rising or falling. Using the attached balance sheet, calculate Wal-Mart's ~~Leverage Ratios~~ to determine whether it is relying more on debt in 2016 than in 2015. Notes: 1) Debt shows up more than one place on Wal-Mart's balance sheet; 2) calculations required.

Debt-equity  
and  
debt to capital  
ratios

$$2016: \text{Debt} = 2708^{+3} + 2745^{+3} + 38,214^{+3} = 43,667$$

$$+7 \text{ DE} = \frac{\text{TD}}{\text{TE}} = \frac{43,667}{83,611} = .5222$$

$$+7 \text{ DTC} = \frac{43,667}{\boxed{83,611} + 43,667} = .3431$$

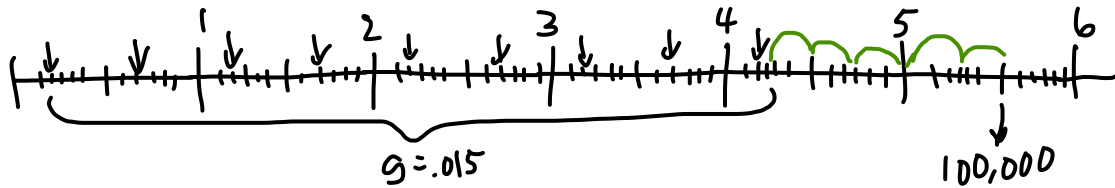
$$2015: \text{Debt} = 1592^{+3} + 4791^{+3} + 40,889^{+3} = 47,272$$

$$+7 \text{ DE} = \frac{47,272}{\boxed{85,437}} = .5501$$

$$+7 \text{ DTC} = \frac{47,272}{\boxed{85,437} + 47,272} = .3549$$

+11  $\Rightarrow$  using less debt in 2016

2. You would like to accumulate \$100,000 by five years and ~~five~~<sup>six</sup> months from today. Two months from today, you plan to make the first of a series of semiannual deposits into an account that pay an APR of 7.5% with quarterly compounding. Each deposit will be 1.5% larger than the previous one and your final deposit will occur four years and two months from today. Set up the calculations needed to determine how large your final deposit needs to be for you to achieve your goal? *Note: If solving for anything except left-hand identify what*



$$+5 r\left(\frac{1}{4}\right) = \frac{.075}{4} \quad (13)$$

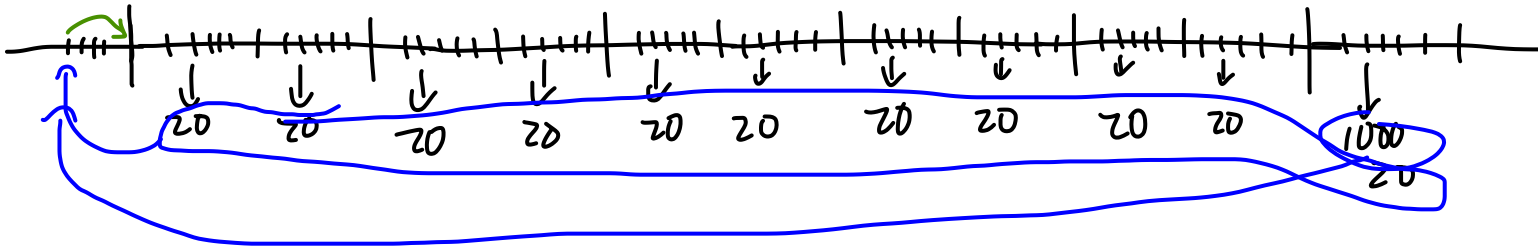
$$+5 r\left(\frac{1}{2}\right) = \left(1 + r\left(\frac{1}{4}\right)\right)^2 - 1 \quad (11)$$

$$(13) \quad +5 V_{4y2m} = \frac{100,000}{(1 + r\left(\frac{1}{4}\right))^{5\frac{1}{2}}} ; 2\frac{4}{6} \text{ if } r\left(\frac{1}{2}\right); 1\frac{4}{2} \text{ if } r(1) \text{ but must be solved for.}$$

$$+5 V_{4y2m} = \left(\frac{C_{2m}}{r\left(\frac{1}{2}\right) - .015}\right) \left( \left(1 + r\left(\frac{1}{2}\right)\right)^9 - (1.015)^9 \right) \Rightarrow \text{solve for } C_{2m} \quad (21)$$

$$+5 C_{4y2m} = C_{2m} (1.015)^6 \quad (17)$$

3. A bond issued by Southwest Aero matures 5 years and 2 months from today for \$1000. The bond pays an annual coupon rate of 4%, but coupons are paid semiannually. Set up the calculations needed to calculate the dirty and clean price of the bond today if the yield to maturity on the bond equals 8.5%.



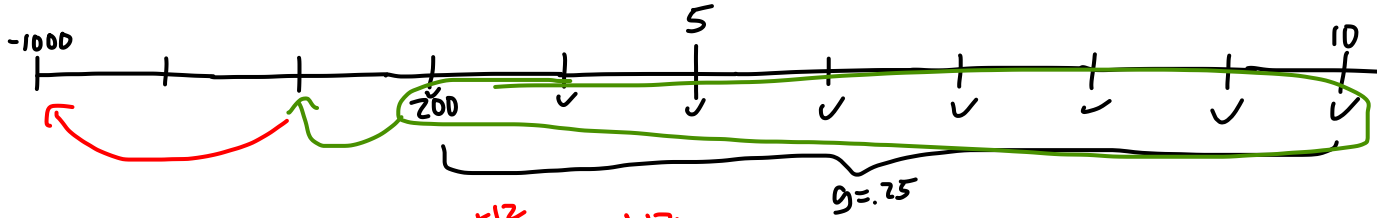
$${}^{+5}y = \frac{.085}{2} = .0425 \quad (15)$$

$$V_{-4m} = \left( \frac{20}{.0425} \right) \left( 1 - \left( \frac{1}{1.0425} \right)^{11} \right) + \frac{1000 + 20}{(1.0425)^{11}} \quad (16) \quad (15)$$

$${}^{+5}V_0 = V_{-4m} (1.0425)^{4/6} = \text{dirty price} \quad (13)$$

$${}^{+5}\text{clean} = V_0 - 20 \left( \frac{4}{6} \right) \quad (16)$$

4. HoHum Portal is considering whether to acquire startup firm, Wow Apps, for \$1 billion. HoHum does not expect Wow to generate any cash flows until three years from today when it generates a net cash inflow of \$200 million. Net cash flows would then grow by 25% per year through 10 years from today. Wow would then shut down. HoHum estimates that the cost of capital for Wow equals 15%. Set up the calculations needed to determine the net present value of the investment by HoHum in Wow.



$$\begin{aligned}
 \text{NPV} &= -1000 + \frac{200}{1.15^3} \left( 1 - \left( \frac{1}{1.15} \right)^8 \right) \left( \frac{1}{1.15} \right)^2 \\
 &= -1000 + \frac{200}{1.15^3} \left( 1 - \frac{1}{1.15^8} \right) \frac{1}{1.15^2}
 \end{aligned}$$

(37)
(27)

5. Each share of Gains ETF trades for \$340. For each outstanding share of Gains ETF, it has purchased ten shares of Agra Corp, it has short-sold five share of Petro Corp, it has purchased Treasury securities that mature one year from today for \$100 and it has short-sold Treasury securities that mature two years from today for \$100. Given the prices and payments given below, set up a table that shows your maximum arbitrage profit (per share). In the table, list the transactions required today and the cash flows today, one year from today, and two years from today from all transactions. Also show that the total cash flows one year from today and two years from today equal zero regardless of whether the economy is weak or strong.

*Notes: Assume Gains ETF pays out all CF it receives; 2) calc required 3) use "+" for inflows & "-" for outflows*

| Security        | Price | Payoff in one year |      | Payoff in two years |      |
|-----------------|-------|--------------------|------|---------------------|------|
|                 |       | Strong             | Weak | Strong              | Weak |
| Agra Corp       | 50    | 10                 | 5    | 100                 | 25   |
| Petro Corp      | 30    | 5                  | 0    | 50                  | 20   |
| 1-Year Treasury | 98    | 100                | 100  | 0                   | 0    |
| 2-Year Treasury | 95    | 0                  | 0    | 100                 | 100  |

$$\text{No-arbitrage price} = 10 \times 50 - 5(30) + 98 - 95 = 353$$

$\Rightarrow$  buy ETF, short eq portfolio

payments by ETF:

$$y1S = 10 \times 10 - 5 \times 5 + 100 = 175$$

$$y1W = 10 \times 5 + 100 = 150$$

$$y2S = 10 \times 100 - 5 \times 50 - 100 = 650$$

$$y2W = 10 \times 25 - 5 \times 20 - 100 = 50$$

| Transaction      | CF <sub>0</sub> | CF <sub>1</sub> |       | CF <sub>2</sub> |        |
|------------------|-----------------|-----------------|-------|-----------------|--------|
|                  |                 | S               | W     | S               | W      |
| +5 Buy ETF       | -340            | +175            | +150  | +650            | +50    |
| +5 Short 10 Agra | +10x50          | -10x10          | -10x5 | -10x100         | -10x25 |
| +5 Buy 5 Petro   | -5x30           | +5x5            | 0     | +5x50           | +5x20  |
| +5 Short 1yr rf  | +98             | -100            | -100  | 0               | 0      |
| +5 Buy 2yr rf    | -95             | 0               | 0     | +100            | +100   |
| <u>Total</u>     | +13             | 0               | 0     | 0               | 0      |