Fall 2016; Fin 3310; 2:30 Midterm B   Name _____Key_____

Note: Problems 3 and 4 on second page.

Short Answer (15 points each)

1. The bid price of Morrogust Inc. $29.75 and the ask price is $29.80. Calculate much will you ~~receive~~ *pay* if you submit
   a market order to buy 200 shares of Morrogust. (Calculations required).

$$\overset{+1}{200} \times \overset{+14}{29.80} = 5960$$

2. Based on the attached financial statements, *and assuming 3M's inventory turnover in 2014 was 4.8 (not the actual #)* did 3M turn over its inventory faster or slower in 2015 than in 2014?
   (Calculations required).

$$2015 = \frac{\overset{+5}{15,383}}{\underset{+5}{3518}} = 4.37 \qquad 2014 = \frac{16,447}{3706} = 4.43 \qquad \Rightarrow slower \, {+5}$$

3. Based on the attached financial statements, *and assuming 3M's debt-to-capital ratio in 2014 was 0.3 (not the actual #)* did a larger or smaller percentage of 3M's capital come from debt in
   2015 compared to 2014? (Calculations required).

$$2015 = \frac{\overset{+3}{2044} + \overset{+3}{8753}}{2044 + 8753 + \underset{+4}{11,747}} = .479 \qquad 2014 = \frac{106 + 6705}{106 + 6705 + 13,142} = .341 \Rightarrow larger \, {+5}$$

4. Assume two annuities are identical except that one has ~~more~~ *a greater number of* payments, which will have a higher present value?

+15 one with greater # of payments

5. Assume interest rates fall by 3%. The price of which of the following bonds should rise the least?
   a) bond matures in 5 years and pays no coupons, b) bond matures in 5 years and pays a 2% coupon, c) bond
   matures in 5 years and pays a 10% coupon, d) bond matures in 10 years and pays no coupons, e) bond
   matures in 10 years and pays a 2% coupon, f) bond matures in 10 years and pays a 10% coupon.

+15 (C)

Problems (75 points each)

See A

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.

4. Assume that for each share it has issued, Audiomech ETF has purchased two shares of Ezio Corp and has sold short one share of Soule Corp. It has also purchased Treasury securities that mature one year from today for $30 and has sold short Treasury securities that mature two years from today for $45. The one-year risk-free rate is 2% per year and the two-year risk-free rate is 3% per year. Audiomech will pay out all cash flows from its investments each year. Audiomech currently trades for $~~375~~ 300, Ezio currently trades for $200, and Soule currently trades for $80. The possible payoffs on Ezio and Soule in each of the next two years depends on the state of the economy as follows:

Year	weak 1 Strong		weak 2 Strong	
State of Economy	~~Strong~~	~~Weak~~	~~Strong~~	~~Weak~~
Ezeio	30	45	150	240
Soule	15	30	60	75

Identify the trades today (per share of Audiomech) that create an arbitrage profit today, show the cash flows created by all trades for ~~all states of~~ a weak the economy ~~in all time periods~~ two years from today, and show your total cash flows for ~~all~~ a weak ~~states of the economy in all time periods~~. Use a "+" to indicate inflows and "−" to indicate outflows. Calculations required. two years from today

Important! You don't have to build the entire table

$$\text{No arbitrage price} = 2 \times 200 - 80 + \underbrace{\frac{30}{1.02}}_{29.412} - \underbrace{\frac{45}{(1.03)^2}}_{42.417} = 306.99 \Rightarrow \text{buy}$$

Payoff on ETF:
yr 1: W = 2×30 − 15 + 30 = 75; S = 2×45 − 30 + 30 = 90
yr 2: W = 2×150 − 60 − 45 = 195; S = 2×240 − 75 − 45 = 360

Trans₀	CF₀	CF₁ W	CF₁ S	CF₂ W	CF₂ S
+5 Buy ETF	−300 +4	+75	+90	+195 +6	+360
+5 Short 2 Ezio	+2×200 +4	−2×30	−2×45	−2×150 +4	−2×240
				+60 +4	+75
+5 Buy Soule	−80 +4	+15	+30	∅ +4	∅
+5 Short 1-yr 4	+29.412 +4	−30	−30	+45 +4	±45
+5 Buy 2-yr 4	−42.417 +4	∅	∅	∅ +4	∅
Total	+6.995 +4	∅			

1 ~~2~~. Two years and five months from today you would like to make the first of a series of semiannual withdrawals from an account that will grow by 2.5% each. You want your first withdrawal to equal $350 and plan to make your final withdrawal ~~seven~~ *six* years and 11 months from today. The account earns an APR of 3.5% with monthly compounding. Set up the calculations needed to determine how much you must deposit today to fund your withdrawals.
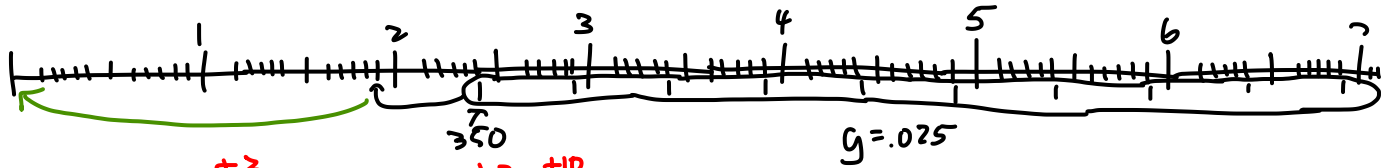
$$+) \quad V_{1y\,11m} = \left(\frac{350}{r(\frac{1}{2})-.025}\right)\left(1 - \left(\frac{1.025}{1+r(\frac{1}{2})}\right)^{10}\right) \qquad \text{(24)}$$
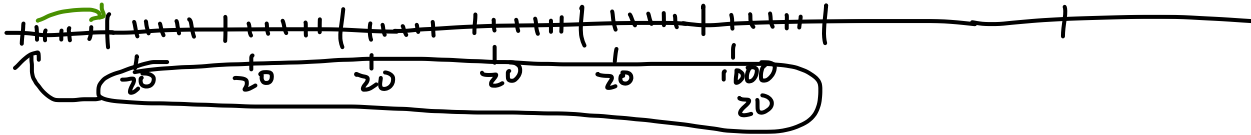
$$+6r(\frac{1}{12}) = \frac{.035}{12} \qquad \text{(19)}$$

$$+6\, r(\frac{1}{2}) = (1+r(\frac{1}{12}))^{6} - 1 \qquad \text{(16)}$$

$$+6\, V_0 = V_{1y\,11m}\left(\frac{1}{1+r(\frac{1}{12})}\right)^{23} \qquad \text{(16)}$$

23. A bond matures for $1000 two years and seven months from today. The coupon rate on the bond (which pays semiannual coupons) is 4% and the clean price of the bond is $950. Set up the calculations needed to determine the yield to maturity on the bond.


$+5$ $DP = 950 + \frac{5}{6}(20)$ (19)

$DP = \left(\frac{20}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^6\right) + \frac{1000}{(1+y)^6}\right)\left(1+y\right)^{5/6}$ $\Rightarrow$ solve for y $+3$

$+5$ $YTM = 2 \times y$

(8)

3-4. Small Effect Corp is considering investing $100 million in a new factory that will generate net monthly cash flows beginning four months from today. The first cash flow will equal $2 million and subsequent cash flows will grow by 5% each through the final cash flow which will occur four years and five months from today. The project's cost of capital equals 8.5%. Set up the calculations needed to determine the net present value of factory.

for year
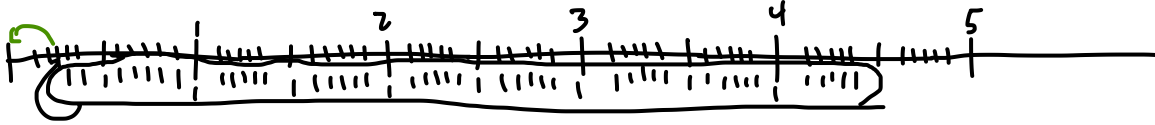
$$NPV = -100 + \left(\frac{2}{r\left(\frac{1}{12}\right) - .05} \right) \left[1 - \left(\frac{1.05}{1 + r\left(\frac{1}{12}\right)} \right)^{50} \right] \left(\frac{1}{1 + r\left(\frac{1}{12}\right)} \right)^{3}$$

$$r\left(\frac{1}{12}\right) = \left((1.085)^{\frac{1}{12}} - 1 \right)$$