Summer 2016: Final A Name key

Note: Problems 4 and 5 are on the second page.

Short Answer (15 points each)

1. Assume a stock will pay dividends that grow at 25% per year for four years and then at 4% per year forever. Just after you estimate that the stock is worth $50 per share, you realize that you used the wrong equity cost of capital. When you correct your error, you find that the actual price of the stock is less than $50. In what direction did you change the equity cost of capital when you corrected your error?

+15 Increased

2. When calculating the ~~NOPAT~~ UNI and Free Cash Flow of a project, you mistakenly used depreciation of $400 per year instead of the actual $200 per year. When you correct your mistake, in what direction will your ~~NOPAT~~ UNI and Free Cash Flow numbers change?

+8/+7 UNI ↑, FCF ↓

3. Why should it be difficult to find stocks with non-zero alphas?

+7/+7/+1 Driven to zero as investors rush to buy positive alpha + sell negative alpha stocks

4. How do the alphas and betas of growth stocks compare to those of value stocks?

+8/+7 lower betas + alphas

5. Assume an initial public offering includes a greenshoe provision for the underwriters. How does the presence of the greenshoe provision help the underwriter gain additional profit if the stock price falls when the stock begins to trade? Rewarded

+7/+7/+1 Sell additional shares at the IPO price then repurchase the shares in the market after the price falls

Problems (75 points each)

Note: Unless I specifically state "calculations required", you only need to set up all solutions. Setting up a solution means you write down the relevant equations and plug in the appropriate numbers. If in any step you are solving for something other than the left-hand side of the equation, be sure to state what you are solving for. If you are using the result of an unsolved equation in a later step, make that clear. One way to do this is to call the result of an earlier step "A" or "B", etc. If you prefer, you can solve everything.

1. No Man's Sky (NMS) currently trades for $580 per share and the market trades for $500 per share. If a year from today the economy is weak, NMS will pay $500 and the market will pay $400. If a year from today the economy is strong, NMS will pay $750 and the market will pay $650. The risk-free interest rate equals 5%. What set of trades today will generate an arbitrage profit today? What arbitrage profit will you earn today? What cash flows will each trade you make today create a year from today if the economy is strong and if it is weak? What transactions will be required a year from today if the economy is strong to close out your positions? ~~Note:~~ Your answer should be a table similar to the ones in the notes and answer keys. Note: calculations required

Equivalent to NMS: buy market; buy risk-free that pays $100 in one year

No arbitrage price for NMS: $500 + \frac{100}{1.05} = 595.238 \Rightarrow$ buy NMS

	CF_0	CF_1 Weak	CF_1 Strong	$Trans_1$
+? Buy NMS	−580 +4	+500 +4	+750 +4	Sell NMS +4
+? Short market	+500 +4	−400 +4	−650 +4	Buy to cover the MKT +4
+? Short risk-free	+95.238 +4	−100 +4	−100 +4	Buy to cover risk-free +4
Total	+15.238 +4	Ø +4	Ø +1	

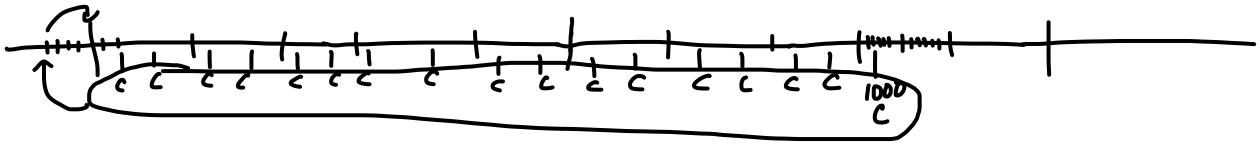
2. Warp Shot bonds mature 8 years and 2 months from today for $1000. The annual coupon rate on the bonds equals 7%, but coupons are paid semiannually. Set up the calculations needed to solve for the yield to maturity on the bond if the clean price of the bond equals $1063.71

$$DP = 1063.71 + \left(\tfrac{4}{6}\right) CPN$$

$$CPN = \frac{.07 \times 1000}{2}$$

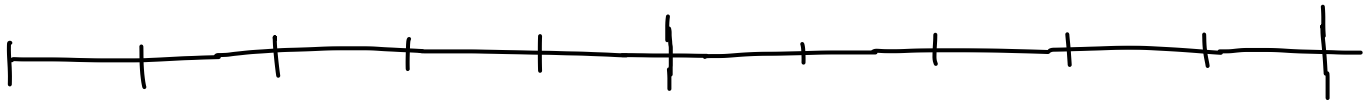
$$DP = \left(\frac{CPN}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^{17}\right) + \frac{1000}{(1+y)^{17}}\,(1+y)^{4/6} \Rightarrow \text{solve for } y$$

(or $DP = \left(\left(\frac{CPN}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^{17}\right)(1+y)^{4/6} + \frac{1000}{(1+y)^{16\frac{2}{6}}}\right)$)



$4 + m = 5 \times 2$

3. Congruent Corp. has just realized earnings of $3 per share. The firm has just paid out 35% of its earnings and has reinvested 65% of its earnings in projects earning a 25% rate of return. Congruent expects to continue reinvesting 65% of its earnings in projects earning a 25% rate of return through eight years from today. Nine years from today, Congruent expects the return on new projects to fall to 3%. At that point, the firm will begin to pay out 80% of its earnings as dividends. If Congruent's equity cost of capital equals 9%, set up the calculations needed to determine the price per share of Congruent's stock.



$g_1 = .65 \times .25$ +3

$g_2 = .2 \times .03$ +3

$E_1 = 3(1+g_1)$ +3

$D_1 = E_1 \times .35$ +3

$E_9 = 3(1+g_1)^9$ +6

$D_9 = .8(E_9)$ +3

$$P_0 = \left(\frac{D_1}{.09-g_1}\right)\left(1-\left(\frac{1+g_1}{1.09}\right)^8\right) + \left(\frac{D_9}{.09-g_2}\right)\left(\frac{1}{1.09}\right)^8$$

+3 +3 +6 +3 +3 +6 +6

4. Your boss at Infrastructure-R-Us Inc. (IRU) has asked you to calculate the firm's weighted average cost of capital so that he can calculate the net present value of several projects the firm is considering undertaking. After doing a little research, you find that IRU has 2,000,000 shares outstanding, that the stock trades for $35 per share, and that the stock has a beta of 1.3. You also find that IRU has $50,000,000 of outstanding bonds and that the yield to maturity on these bonds equals 11%. In a report by Goldman Sachs, you find that IRU's debt has a B rating and that the expected loss per dollar of debt if the firm defaults is 65%. Looking at IRU's financial statements, you find that IRU's marginal tax rate equals 35%. And you find that the risk-free rate varies by maturity as follows: 1-year = 0.6%, 2-year = 0.7%; 3-year = 0.9%; 5-year = 1.2%; 7-year = 1.4%; 10-year = 1.6%, 20-year = 1.9%, 30-year = 2.3%. Set up the calculations needed to calculate IRU's weighted average cost of capital if you expect the stock market to earn 9% per year.

$E = 2{,}000{,}000 \times 35$ +6

$D = 50{,}000{,}000$ +4

+9($r_E = .016 + 1.3(.09 - .016)$ +4 +4 +9

+9($r_D = .11 - .055(.65)$ +4 +9 +4

+9($r_{WACC} = \left(\frac{E}{E+D}\right) r_E + \left(\frac{D}{E+D}\right) r_D (1 - .35)$ +4

5. Olympian Fever Inc. is considering investing $37.5 million today in a new retail store. The new store will fall into the 15-year MACRS class and will be built on land Olympian acquired a year ago for $3 million. This land could be sold today for $4 million after taxes. Olympian expects revenues a year from today to equal $500 million. In the following years, sales are expected to grow by 2% per year. Olympian Fever Inc. estimates that variable costs be the same as at existing stores and thus will equal 75% of revenues that and fixed costs associated with the store will equal $87.5 million per year. The $100 million per year spend operating Olympian's corporate headquarters will not change as a result of the new store, but 10% of this cost will be allocated to the new store. Net working capital (in millions) associated with the store will be as follows:

	Year	0	1	2	3	4	5
	Cash	0.00	30.00	31.31	32.95	32.88	35.30
+	AR	0.00	16.25	16.24	17.56	18.52	18.35
+	Inv	0.00	63.75	66.45	69.20	72.40	73.49
−	AP	0.00	62.50	62.95	63.14	67.25	72.73
					56.57	56.55	

Set up the calculations needed to determine the new store's unlevered net income and free cash flow today and four years from today if Olympian's marginal tax rate equals 35%.

$UNI_0 = 0$

$FCF_0 = 0 + 0 - (37.5 + 4) - 0$ +6 +5

$UNI_4 = (R_4 - E_4 - D_4)(1 - .35)$ +10

$R_4 = 500(1.02)^3$ +11

$E_4 = .75(R_4) + 87.5$ +10

$D_4 = 37.5(.0770)$ +11

$FCF_4 = UNI_4 + D_4 - 0 - \Delta NWC_4$ +10

$\Delta NWC_4 = 56.55 - 56.57$ +12