Summer 2016: Final B Name Key

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

Short Answer (15 points each)

1. Assume you are valuing a stock and estimate that the stock's dividends will grow at 15% per year for ten years and then at 2% per year forever. Just after you estimate that the stock is worth $25 per share, you realize that your estimate of the initial growth for dividends should not have been 15%. When you correct your error, you find that the actual price of the stock is less than $25. In what direction did you change the initial growth rate for dividends when you corrected your error?

+15 lower

2. When calculating the ~~NOPAT~~ UNI and Free Cash Flow of a project, you mistakenly used depreciation of $100 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 falls, FCF increases

3. What is the downside of investors hanging on to losers and selling winners?

+15 one of: higher taxes, losing stocks tend to underperform winners over the next year

4. On average, what kind of alphas do fund managers earn after transaction costs?

+15 negative

5. How does a greenshoe provision allow the underwriters to make additional profit on an initial public offering if the stock price rises after the issue? Reworded

+8/+7 sell additional shares at IPO price, exercise greenshoe provision to cover their short position

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 $115 per share and the market trades for $200 per share. If a year from today the economy is weak, NMS will pay $50 and the market will pay $150. If a year from today the economy is strong, NMS will pay $200 and the market will pay $300. The risk-free interest rate equals 10%. 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; short-sell risk-free that matures for $100 in 1 yr

No-arbitrage price for NMS $= 200 - \frac{100}{1.1} = 109.09 \Rightarrow$ short-sell NMS

($\frac{100}{1.1}$: CF_1)

$Trans_0$	CF_0	W	S	$Trans_1$
+1 Short-sell NMS	$+115^{+4}$	-50^{+4}	-200^{+4}	Buy to cover NMS $^{+4}$
+1 Buy market	-200^{+4}	$+150^{+4}$	$+300^{+4}$	Sell market $^{+4}$
+1 Short-sell risk-free	$+90.91^{+4}$	-100^{+4}	-100^{+4}	Buy to cover risk-free $^{+4}$
Total	$+5.91^{+4}$	$\emptyset^{+1}$	$\emptyset^{+1}$	

2. Warp Shot bonds mature 7 years and 10 months from today for $1000. The annual coupon rate on the bonds equals 4%, 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 is $935.78.

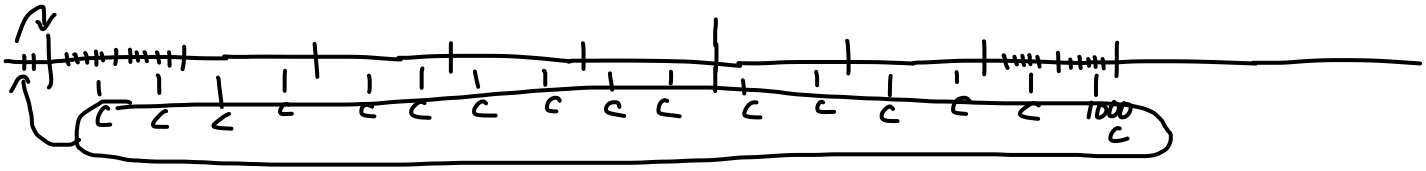
$$DP = 935.78 + \left(\tfrac{2}{6}\right) CPN$$

$$CPN = \frac{.04 \times 1000}{2}$$

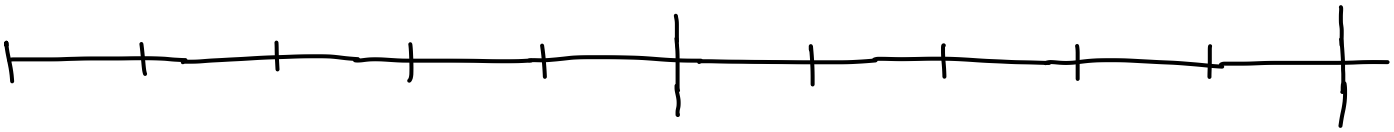
$$DP = \left(\left(\frac{CPN}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^{16}\right) + \frac{1000}{(1+y)^{16}}\right)\left(1+y\right)^{2/6} \Rightarrow \text{solve for } y$$

$$\text{or } DP = \left(\left(\frac{CPN}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^{16}\right)\left(1+y\right)^{2/6} + \frac{1000}{(1+y)^{15\frac{4}{6}}}\right)$$

$$YTM = y \times 2$$



3. Congruent Corp. has just realized earnings of $10 per share. The firm has just paid out 25% of its earnings and has reinvested 75% of its earnings in projects earning a 30% rate of return. Congruent expects to continue reinvesting 75% of its earnings in projects earning a 30% rate of return through seven years from today. Eight years from today, Congruent expects the return on new projects to fall to 5%. At that point, the firm will begin to pay out 90% 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. 10



$g_1 = .75 \times .3$ +3

$g_2 = .1 \times .05$ +3

$E_1 = 10(1+g_1)$ +3

$D_1 = .25 \times E_1$ +3

$E_8 = 10(1+g_1)^8$ +6 +6

$D_8 = .9 \times E_8$ +3

$$P_0 = \left(\frac{D_1}{.1-g_1}\right)\left(1-\left(\frac{1+g_1}{1.1}\right)^7\right) + \left(\frac{D_8}{.1-g_2}\right)\left(\frac{1}{1.1}\right)^7$$

+3 +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 6,000,000 shares outstanding, that the stock trades for $90 per share, and that the stock has a beta of 0.8. You also find that IRU has $200,000,000 of outstanding bonds and that the yield to maturity on these bonds equals 9%. In a report by Goldman Sachs, you find that IRU's debt has a CCC rating and that the expected loss per dollar of debt if the firm defaults is 55%. 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 7% per year.

$E = 6{,}000{,}000 \times 90$ +6

$D = 200{,}000{,}000$ +4

+9 ($r_E = .016 + .8(.07 - .016)$ +4 +4 +9

+9 ($r_D = .09 - .122(.55)$ +4 +9 +4

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

5. Olympian Fever Inc. is considering investing $11.25 million today in a new retail store. The new store will fall into the ~~15~~ 10-year MACRS class and will be built on land Olympian acquired a year ago for $1 million. This land could be sold today for $1.5 million after taxes. Olympian expects revenues a year from today to equal $150 million. In the following years, sales are expected to grow by 4% per year. Olympian estimates that variable costs be the same as at existing stores and thus will equal 70% of revenues that and fixed costs associated with the store will equal $26.5 million per year. The $30 million per year spend operating Olympian's corporate headquarters will not change as a result of the new store, but 20% 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	9.00	9.39	9.89	9.86	10.59
+	Acct. Receive	0.00	4.88	4.87	5.27	5.56	5.51
+	Inventory	0.00	19.13	19.94	20.76	21.72	22.05
−	Acct. Payable	0.00	18.75	18.89	18.94	20.18	21.82
					16.98	16.96	

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%.

$UNI_0 = 0$

$FCF_0 = 0 + 0 - (11.25 + 1.5) - 0$ +6 +5

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

$R_4 = 150(1.04)^3$ +11

$E_4 = .7(R_4) + 26.5$ +10

$D_4 = 11.75\ (.1152)$ +11

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

$\Delta NWC_4 = 16.96 - 16.98$ +12