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Problems (75 points each)

Note: Unless I specifically state "Calculations required", you can just set up all problems. 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 in any step you are solving for something other than the left-hand side of the equation, indicate which variable you are solving for. If you prefer, you can solve everything (but this will take longer).

1. Assume perfect capital markets. Assume also that two firms possess identical assets that will pay either $100 or $300 a year from today. Ajax has debt that matures for $75 one year from today. This debt trades for $70 today while Ajax stock trades for $100. Bounce has debt that matures for $150 one year from today. Bounce's debt trades for $115 while Bounce's stock trades for $60. Set up a table that shows the set of arbitrage trades today will generate an arbitrage profit, the arbitrage profit today, and that the net cash flows from this arbitrage always equal $0 a year from today. Calculations required.

$V_A = 100 + 70 = 170 \Rightarrow$ buy

$V_B = 115 + 60 = 175 \Rightarrow$ short

Transaction	CF_0	\$100	\$300
+6 Buy A bonds	−70 +4	+75 +4	+75 +4
+6 Buy A stock	−100 +4	+25 +4	+225 +4
+6 short B bonds	+115 +4	−100 +4	−150 +4
+6 short B stock	+60 +4	0 +4	−150 +4
	+5 +3	Ø	Ø

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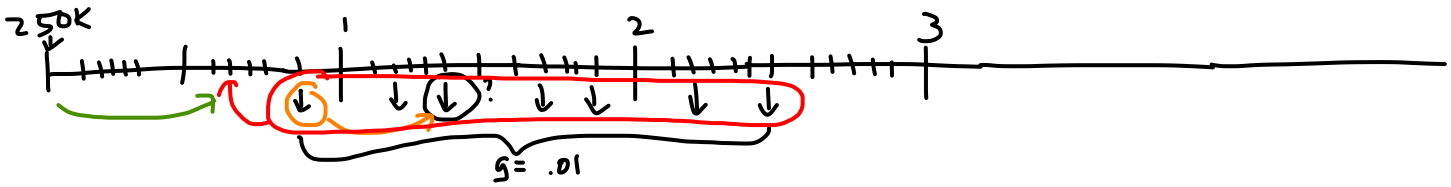
2. You have just deposited $250,000 in an account that pays an APR or 5% per year with semiannual compounding. You plan to make the first quarterly withdrawal from this account 11 months from today and will make your final withdrawal 2 years and 5 months from today. If you plan for your withdrawals to increase by 1% each, set up the calculations that will allow you to determine how large your 3rd withdrawal can be.



$V_{8m} = 250(1+r(\frac{1}{4}))^{2\frac{2}{3}} = A$ +16

$r(\frac{1}{2}) = \frac{.05}{2}$ +9

$r(\frac{1}{4}) = (1+r(\frac{1}{2}))^{1/2} - 1$ +9

$V_{8m} = \left(\frac{C_{11m}}{r(\frac{1}{4})-.01}\right)\left(1-\left(\frac{1.01}{1+r(\frac{1}{4})}\right)^{7}\right) = B$ +16 $\Rightarrow$ set $A=B$ + solve for C_{11m} +9

$C_{14.5m} = C_{11m}(1.01)^2$ +16

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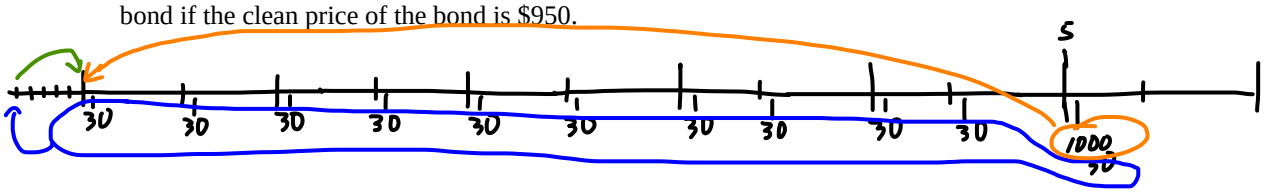
3. Carry Inc.'s outstanding bonds mature 5 years and 1 month from today for $1000. The annual coupon rate equals 6% and coupons are paid semiannually. Set up the calculations needed to determine the yield to maturity on the bond if the clean price of the bond is $950.



$\text{coupon} = \frac{.06(1000)}{2} = 30$ +7

$DP = 950 + 30\left(\frac{5}{6}\right)$ +14

$DP = \left(\frac{30}{y}\right)\left(1 - \left(\frac{1}{1+y}\right)^{11}\right)(1+y)^{5/6} + \frac{1000}{(1+y)^{10\frac{1}{6}}}$ $\Rightarrow$ solve for y +5

+14 +14 +14

yield to maturity = $y \times 2$ +7

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4. DontDrive Corp. is considering investing $16 million to expand its fleet of jets. The jets would be depreciated beginning a year from today using the 10-year MACRS class. DontDrive estimates that the new fleet will generate $50 million of additional revenue one year from today. Revenues are then expected to grow at a rate of 3% per year for the foreseeable future. Variable costs equal 64% of sales and fixed costs associated with the new jets will equal $4.8 million per year. DontDrive's tax rate equals 35%. DontDrive will not issue any long-term debt to fund the new jets, but the interest rate on the new short-term debt will equal 6%. With the additional jets, DontDrive will be large enough to demand a discount on the fuel it purchases. DontDrive estimates that it will save $1 million per year in fuel costs on its existing fleet if it proceeds with the expansion. The incremental working capital associated with the new jets for the next five years will equal:

Year	0	1	2	3	4	5
Cash	0	2819	2783	2999	3079	3191
Accts Rec	0	5719	6078	6568	6542	6760
Inventory	0	1094	1166	1210	1283	1278
Accts Payable	0	2365	2475	2441	2457	2467
Short-term Debt	0	41	41	41	44	44

Set up the calculations needed to determine the unlevered net income and free cash flows associated with the jets in year 3.

$UNI_3 = (R_3 - E_3 - D_3)(1 - T_c)$ +14

$R_3 = 50(1.03)^2$ +11

$E_3 = .64R_3 + 4.8 - 1$ +11

$D_3 = 16(.1440)$ +11

$T_c = .35$

ϕ +3

$FCF_3 = UNI_3 + D_3 - CE_3 - \Delta NWC_3$ +14

$\Delta NWC_3 = NWC_3 - NWC_2$ +11

$NWC_3 = 2999 + 6568 + 1210 - 2441$

$NWC_2 = 2783 + 6078 + 1166 - 2475$

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5. Exercise Inc. has 2,000,000 share outstanding. It also has $5,000,000 of outstanding debt and $2,000,000 of excess cash. In each of the next four years (starting a year from today), Exercise expects to generate free cash flows of: $4,000,000; $8,000,000; $10,000,000; and $11,000,000. Thereafter, free cash flows are expected to grow at 3% per year forever. Set up the calculations needed to determine the price per share of Exercise's stock if its weighted average cost of capital equals 9%.

$$V_0 = \overset{+11}{\frac{4}{1.09}} + \overset{+11}{\frac{8}{(1.09)^2}} + \overset{+11}{\frac{10}{(1.09)^3}} + \overset{+11}{\left(\frac{11}{.09-.03}\right)}\overset{+11}{\left(\frac{1}{1.09}\right)^3}$$

$$\text{Price: } \frac{V_0 + 2 - 5}{2} \overset{+11}{\underset{+9}{}}$$

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6. Given the following information, set up the calculations needed to determine the average annual return and standard deviation of returns on Fold Inc. from December 31, 2011 through December 31, 2014. Assume all dividends are reinvested.

Date	Div	Price
12/31/2014	0	25.27
6/19/2014	0.88	26.93
12/31/2013	0	28.03
6/20/2013	0.76	23.25
12/31/2012	0	20.99
6/21/2012	0.68	19.53
12/30/2011	0	17.91

$r(6/21) = \frac{.68}{17.91} + \frac{(19.53 - 17.91)}{17.91} = A$ +5

$r(12/31/12) = \frac{20.99 - 19.53}{19.53} = B$ +5

$r(6/20) = \frac{.76}{20.99} + \frac{23.25 - 20.99}{20.99} = C$ +5

$r(12/31/13) = \frac{28.03 - 23.25}{23.25} = D$ +5

$r(6/19) = \frac{.88}{28.03} + \frac{26.93 - 28.03}{28.03} = E$ +5

$r(12/31/14) = \frac{25.27 - 26.93}{26.93} = F$ +5

$r(2012) = (1+A)(1+B) - 1 = G$ +5

$r(2013) = (1+C)(1+D) - 1 = H$ +5

$r(2014) = (1+E)(1+F) - 1 = I$ +5

$\bar{r} = \frac{G + H + I}{3}$ +15

$SD = \sqrt{\frac{(G-\bar{r})^2 + (H-\bar{r})^2 + (I-\bar{r})^2}{2}}$ +15

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7. Assume perfect capital markets. Assume also that Grab Corp. has 100,000 shares outstanding and that the firm's stock trades for $25 per share. Grab also has debt outstanding with a market value of $1,000,000. Grab's debt is risk-free and so earns a risk-free rate of 4%. Grab's stock has a beta of 1.2 and the market risk premium equals 6%.
   a. Set up the calculations needed to determine Grab's equity cost of capital.
   b. Set up the calculations needed to determine Grab's equity cost of capital if the firm decides to issue enough equity to pay off $400,000 of its debt.

a. $r_E = .04 + 1.2(.06) = A$ +25

b. $r_U = \left(\frac{D}{D+E}\right).04 + \left(\frac{E}{D+E}\right)A$

$D = 1,000,000$

$E = 100,000 \times 25$ +25

$r_E = r_U + \left(\frac{D_2}{E_2}\right)(r_U - .04)$

$D_2 = (1,000,000 - 400,000)$

$E_2 = E + 400,000$ +25

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8. Assume the corporate tax rate equals 25%, that the personal tax rate on dividends equals 15%, that the tax rate on capital gains equals 30%, and that the tax rate on interest equals 20%.
   a. Do firms has a tax incentive to pay out or to retain and reinvest surplus cash? Calculations required. Assume any surplus cash would be reinvested in risk-free securities.
   b. If firms pay out cash to stockholders, do they have a tax incentive to pay out the cash as a dividend or through a repurchase of shares? Calculations required.

a. $\tau^*_{retain} = \left(1 - \frac{(1-.25)(1-.3)}{(1-.2)}\right) = .34375$ (+25) $\Rightarrow$ incentive (+13) to pay out

b. $\tau_d = \left(\frac{.15-.3}{1-.3}\right) = -.2143$ (+24) $\Rightarrow$ incentive (+13) to pay dividends