AGEC $424$ EXAM 2 (134 points) Fall 2012

You must show logically correct work, including calculator inputs and outputs for all problems to receive credit. Show signs on calculator inputs. Differentiate calculator outputs from inputs.

I may not have written “show your work here” on all the questions, but you still must show your work!

1. Janet Elliott just turned 20, and received a gift of $20,000 from her rich uncle. Janet plans ahead and would like to retire on her 55th birthday. She thinks she’ll need to have about $2 million saved by that time in order to maintain her lavish lifestyle. She wants to make a payment at the end of each year until she’s 50 into an account she’ll open with her uncle’s gift. After that she’d like to stop making payments and let the money grow at interest until it reaches $2 million when she turns 55. Assume she can invest at 7% compounded annually. Ignore the effect of taxes. Show work
   a. (6 points) How much will she have to invest each year in order to achieve her objective?

   Step 1. Discount the $2 million back 5 years
   \[ N = 5 \]
   \[ I = 7 \%
   \[ P_{MT} = 20 \]
   \[ FV = 2,000,000 \]
   \[ PV = \frac{2,000,000}{(1 + 0.07)^5} = 1,425,972.36 \]

   Step 2. Find the payment
   \[ N = 30 \]
   \[ I = 7 \%
   \[ PV = -20600 \]
   \[ FV = 1,425,972.36 \]
   \[ P_{MT} = \frac{20600}{(1 + 0.07)^{30}} = -13,484.19 \]

   b. (2 points) What percent of the $2 million will have been contributed by Janet (including the $20,000 she got from her uncle)? Show work
   \[ \frac{20000 + 13,484.19 \times 30}{20000} = 21.23\% \]

2. a. (7 points) What is the monthly payment on a 5-year car loan of $30,000 at 5.25% interest compounded monthly? Show work
   \[ N = 5 \times 12 = 60 \]
   \[ I = 5.25/12 \%
   \[ PV = 30,000 \]
   \[ FV = 0 \]
   \[ P_{MT} = \frac{30,000}{(1 + 0.0525/12)^{60}} \approx -569.58 \]
   \[ \approx \$569.58 \]

   b. (13 points) Construct an amortization table below for the first 2 months of the loan. Show work

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30,000</td>
<td>569.58</td>
<td>131.25</td>
<td>438.33</td>
<td>29,561.47</td>
</tr>
<tr>
<td>2</td>
<td>29,561.67</td>
<td>569.58</td>
<td>129.33</td>
<td>440.25</td>
<td>29,121.42</td>
</tr>
</tbody>
</table>

\[ 30,000 \times 0.0525/12 = 131.25 \]
\[ 29,561.67 \times 0.0525/12 = 129.33 \]
3. (4 points) The Orion Corp. is evaluating a proposal for a new project. It will cost $50,000 to get the undertaking started. The project will then generate cash inflows of $20,000 in its first year and $16,000 per year in the next five years after which it will end. Orion uses an interest rate of 15% compounded annually for such evaluations.

   a. Calculate the “Net Present Value” (NPV) of the project by treating the initial cost as a cash outflow (a negative) in the present, and adding the present value of the subsequent cash inflows as positives. **Show work**

   \[ CF_0 = -50,000 \]
   \[ CF_1 = 20,000 \]
   \[ CF_2 - CF_1 = 16,000 \]

   \[ \text{I} = 15 \]
   \[ \text{Compute NPV = 140,29.98} \]

   (1)

   b. What is the implication of a positive NPV? (Words only.)

   **The cash inflows exceed the cash outflow in present value and it is a profitable investment.**

4. (3 points) You purchased a piece of property for $30,000 nine years ago and sold it today for $83,190. What was the annual rate of return on your investment? **Show work**

   a. 12%
   b. 11%
   c. 10%
   d. 9%

5. (3 points) Using an annual interest rate of 9%, how long will it take a deposit of $1,000 to grow to $3,000, assuming no additional deposits are made? **Show work**

   a. 8.04 years
   b. 10.00 years
   c. 11.11 years
   d. 12.75 years
   e. 13.50 years

6. (3 points) The Summer Breeze Hotel borrowed $100,000 from the Meadowlands Bank to pay for a new air conditioning system. The loan is for a period of 5 years at an interest rate of 10% and requires 5 equal end-of-year payments that include both principal and interest on the outstanding balance. What will be the outstanding balance after the third payment? Hint: use the trick explained in lecture. **Show work**

   a. $60,000
   b. $20,865
   c. $45,788
   d. $50,866

7. (4 points) You want to purchase a car for $40,000 when you graduate in two years. At that time you will take out a 5-year bank loan at 12% compounded monthly. Based on your estimated earnings, you think you’ll be able to afford loan payments of $750 per month. You plan to save up the difference between the cost of the car and the amount you’ll borrow by making quarterly deposits over the next two years in a bank account that pays 8% compounded quarterly. How large must those deposits be? **Show work**

   \[ N = 60, I = 12/12, PV = 33,716.28, FV = 0, PMT = 732.11 \]
8. (3 points) Your monthly statement from your bank credit card shows that the monthly rate of interest is 1.5%. What is the effective annual rate of interest you are being charged on your credit card? Show work
   a. 18.00%
   b. 18.64%
   c. 19.56%
   d. 29.74%

9. (4 points) Smith Blarney is trying to sell my grandmother a semiannual, 10% coupon, $1000 face value bond with 12 years to maturity. Currently the market requires a 6% rate of return on bonds of this risk. What is this bond worth? Show work
   \[ N = 12 \times 2 = 24; \ I = \frac{6}{2} = 3; \ PMT = 100/2 = 50; \ FV = 1000 \]
   \[ PV = 1338.71 \]

10. Thompson Tires Inc. has an outstanding semiannual, 12% coupon, $1000 face value bond that is selling for $1185 and has 10 years to maturity.
   a. (4 points) What is the yield to maturity of this bond? Show work
   \[ N = 20; \ PV = -1185; \ PMT = 60; \ FV = 1000 \]
   \[ I? = 4.569 \times 2 = 9.14\% \]

   b. (2 points) What is the current yield of this bond? Show work
   \[ CY = \frac{120}{1185} = 10.13\% \]

11. (4 points) Assume the Thompson Tires bond above is callable in 5 years with a $50 call premium. What is the YTC? Show work
   \[ N = 10; \ PV = -1185; \ PMT = 60; \ FV = 1050; \]
   \[ I? = 4.1196 \times 2 = 8.23\% \]

12. (4 points) Smith Blarney is back trying to sell Grandma a 10 year, callable, semiannual, $1000 face value, 12% coupon bond for sale. It is callable in 1 year with a $100 call premium. If comparable bonds of this risk yield 6% and you expect this bond to be called, what is its value? Show work
   \[ N = 2; \ I = 3; \]
   \[ PV = 1151.66; \ PMT = 60; \ FV = 1100 \]

13. (4 points) The Spinnaker Company has paid an annual dividend of $2 per share for some time. Recently, however, the board of directors voted to grow the dividend by 6% from now on. What is the most you would be willing to pay for a share of Spinnaker if you expect a 10% return on your stock investments? Show work
   \[ P_0 = \frac{2(1.06)}{0.10 - 0.06} = \frac{2.12}{0.04} = $53.00 \]
14. (12 points) Genestek Inc. just paid a $5.00 dividend. Due to a new product about to be released, analysts expect the company to grow at a supernormal rate of 15% for three years. After that it is expected to grow at a normal rate of 4% indefinitely. Stocks similar to Genestek are currently earning shareholders a return of 12%.

\[ D_0 = 5.00 \; ; \; D_1 = 5.75 \; ; \; D_2 = 6.61 \; ; \; D_3 = 7.60 \; ; \; D_4 = 7.9085 \]

a. The estimated selling price of the stock is: Show work

\[ P_0 = \frac{D_4}{.12-.04} = 98.86 \]

\[ CF_0 = 0 \]
\[ CF_1 = 5.75 \]
\[ CF_2 = 6.61 \]
\[ CF_3 = 7.60 + 98.86 = 106.46 \]
\[ \frac{106.46}{98.86} = 1.075 \]
\[ \frac{7.9085}{86.18} = .09 \]
\[ \text{Comp NPV = } 86.18 \]

b. If everything goes as projected what will the price of the stock be one year from now, and what are the expected dividend and capital gains yield the first year assuming the stock is purchased for the price in part a. Show work

\[ CF_0 = 0 \]
\[ CF_1 = 6.61 \]
\[ CF_2 = 106.46 \]
\[ \frac{90.77 - 86.18}{86.18} = 5.33\% \text{ Cap gains yield} \]
\[ \frac{106.46}{86.16} = 1.23\% \text{ Div yield} \]

15. (8 points) Frazier Manufacturing paid a dividend last year of $2, which is expected to grow at a constant rate of 5%. Frazier has a beta of 1.3. If the market is returning 11% and the risk-free rate is 4%, calculate the value of Frazier's stock. Show work

\[ K_{Fraz} = 4 + 1.3(11-4) = 13.1\% \]
\[ P_0 = \frac{2(1.05)}{.131-.05} = \$25.93 \]

16. (6 points) Assume the following facts about a company:

<table>
<thead>
<tr>
<th>Capital</th>
<th>0% debt</th>
<th>40% debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>-</td>
<td>1200</td>
</tr>
<tr>
<td>Equity</td>
<td>$3,000</td>
<td>1800</td>
</tr>
<tr>
<td>Total Capital</td>
<td>$3,000</td>
<td>3000</td>
</tr>
<tr>
<td>Shares @ $10 =</td>
<td>300</td>
<td>300-120=180</td>
</tr>
<tr>
<td></td>
<td>Taxes @ 40%</td>
<td>Earnings after Tax</td>
</tr>
</tbody>
</table>

What will be the company's new EPS if it borrows money at 10% interest and uses it to retire stock until capital is 40% debt? The stock can be purchased at its book value of $10 per share. To answer this question fill in the above table and show the EPS calculation below.

a. $3.33
b. $4.89
c. $2.93
d. none of the above
17. (2 points) Which of the following statements is false?
   a. Beta is meaningful only if an investor holds a well-diversified portfolio.
   b. You can completely eliminate risk if you hold a well diversified portfolio.
   c. A portfolio composed of only one stock will not be well diversified.
   d. A wise investor diversifies to capture the high average return of stocks while avoiding as much risk as possible.
   e. All of the above statements are correct.

18. (2 points) Which of the following is not an example of a source of systematic or market risk?
   a. Interest rate changes
   b. Foreign competition with an industry’s products
   c. Changes in the overall economic outlook
   d. Changes in the inflation rate

19. (2 points) Market risk:
   a. is the degree to which a stock’s return moves with the market’s return.
   b. is caused by things that affect specific companies or industries.
   c. can be diversified away.
   d. is the chance of losing money in the stock market.

20. (2 points) A statistic known as a stock’s beta coefficient measures:
   a. total risk.
   b. systematic or market risk.
   c. unsystematic or business-specific risk.
   d. none of the above

21. (2 points) The only component of the CAPM equation that relates specifically to a company is:
   a. $\beta X$
   b. $kM$
   c. $kRF$
   d. $(kM - kRF)$

22. (2 points) Phoenix Company common stock is currently selling for $20 per share. Security analysts at Smith Blarney have assigned the following probability distribution to the price of (and rate of return on) Phoenix stock one year from now:

<table>
<thead>
<tr>
<th>Price</th>
<th>Rate of Return</th>
<th>Probability</th>
<th>Assuming that Phoenix is not expected to pay any dividends during the coming year, determine the expected rate of return on Phoenix Stock. Show work</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16$</td>
<td>$-20%$</td>
<td>0.25</td>
<td>$\frac{P_i - P^0}{P^0} = 0.25 - 0.20 = -5%$</td>
</tr>
<tr>
<td>20</td>
<td>0%</td>
<td>0.30</td>
<td>$\frac{P_i - P^0}{P^0} = 0.30 - 0.20 = 10%$</td>
</tr>
<tr>
<td>24</td>
<td>$+20%$</td>
<td>0.25</td>
<td>$\frac{P_i - P^0}{P^0} = 0.25 - 0.20 = 5%$</td>
</tr>
<tr>
<td>28</td>
<td>$+40%$</td>
<td>0.20</td>
<td>$\frac{P_i - P^0}{P^0} = 0.20 - 0.20 = 0%$</td>
</tr>
</tbody>
</table>

   $\frac{\text{Assuming that Phoenix is not expected to pay any dividends during the coming year, determine the expected rate of return on Phoenix Stock. Show work}}{8\%}$

   a. 10%
   b. 0%
   c. 10%
   d. 40%

23. (2 points) Determine the beta of a portfolio consisting of equal investments in the following common stocks: Show work

<table>
<thead>
<tr>
<th>Security</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Computer</td>
<td>1.15</td>
</tr>
<tr>
<td>Coca-Cola</td>
<td>1.05</td>
</tr>
<tr>
<td>Harley-Davidson</td>
<td>1.50</td>
</tr>
<tr>
<td>Homestake Mining</td>
<td>0.50</td>
</tr>
</tbody>
</table>
   a. 1.05
   b. 1.00
   c. 1.10
   d. 0.95

   $\frac{4.2}{4} = 1.05$
24. (4 points) Charlie Dobbs is considering investing in Astrotech. His research has revealed the following:
   The market is returning 11%.
   Three month treasury bills are yielding 5%.
   Astrotech’s beta is 1.2.
   Astrotech recently paid a dividend of $1.50.
   Analysts expect Astrotech to grow at 4% indefinitely.
   How much should Charlie be willing to pay for a share of Astrotech? **Show work**
   a. $19.02
   b. $12.00
   c. $10.26
   d. $18.29

25. (2 points) Weisman Electronics just paid a $1.00 dividend, the market yield is yielding 10%, the risk-free rate is 4%, and Weisman’s beta is 1.5. How fast do investors expect the company to grow in the future if its stock is selling for $27.25. **Show work**
   \[ K_{Wes} = 4 + 1.5(10-4) = 13\% \]
   \[ D_0 = \frac{1.00}{1.05} \]
   \[ P_0 = \frac{1.5(1.04)}{1.02 - 0.04} = \frac{1.56}{0.98} = 1.59 \]

26. (2 points) Internet Corporation has EBIT of $1 million, 30% debt in their capital structure, and total capital of $10 million. Their tax rate is 35%. What is their return on capital employed (ROCE)? **Show work**
   \[ \frac{1,000,000}{10,000,000} \cdot (0.65) = 0.65 = 6.5\% \]

27. (2 points) A firm has EBIT of $3.6M and debt of $15M on which it pays 8% interest. What is its Degree of Financial Leverage (DFL)? **Show work**
   \[ DFL = \frac{EBIT}{EBIT-I} = \frac{3.6M}{3.6M - 0.08(15M)} = \frac{3.6}{2.4} = 1.5 \]

28. (2 points) Harris Inc. has EBIT of $1,500 and debt of $5,000 on which it pays 12% interest. Its EPS is currently $2.35 per share. Management anticipates a difficult period ahead and fears EBIT could decline by as much as 20%. What will the new EPS be if that happens? **Show work**
   \[ DFL = \frac{0.50}{1500 - 0.12(5000)} = \frac{1500}{900} = 1.75 \]
   \[ 2.35 \cdot \left(1 - \frac{1}{3}\right) = 2.35 \cdot \frac{2}{3} = 1.57 \]

29. (2 points) A firm has a product that sells for $25. The direct cost of manufacturing the product is $15 per unit. The product’s contribution margin is: **Show work**
   \[ \frac{25-15}{25} = 0.40 = 40\% \]
   a. $10
   b. 40%
   c. 60%
   d. 67%
30. (4 points) Assume the following facts about a firm that sells just one product:

<table>
<thead>
<tr>
<th>Selling price per unit</th>
<th>$24.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable costs per unit</td>
<td>$18.00</td>
</tr>
<tr>
<td>Total monthly fixed costs</td>
<td>$2,500</td>
</tr>
</tbody>
</table>

What is the firm's monthly breakeven volume in units? **Show work**

- 417 units
- 1,250 units
- 5,000 units
- 1,667 units

31. (2 points) Last year Avator's operating income (EBIT) increased by 22% while its dollar sales increased by 15%. What is Avator's degree of operating leverage (DOL)? **Show work**

- a. .68
- b. 2.0
- c. 1.47
- d. .32

32. (2 points) Porter Productions sells videotapes for $15.00 each. Their variable cost per unit is $9.00. In addition, they incur $180,000 in fixed costs each year. At 40,000 units of sale, what is Porter's degree of operating leverage (DOL)? **Show work**

- a. 1.33
- b. 2.50
- c. 3.00
- d. 4.00
- e. 6.00

33. (2 points) Illinois Tool Company's (ITC) degree of total leverage (DTL) is 3.00 at a sales volume of $9 million. Determine ITC's percentage change in earnings per share (EPS) if forecasted sales increase by 20 percent to $10,800,000. **Show work**

- a. 60%
- b. 50%
- c. 32%
- d. none of the above

34. (4 points extra credit) Conestoga Ltd. has the following probability distribution of returns. Calculate Conestoga's expected return, variance, standard deviation of return, and the return's coefficient of variation. **Show work**

<table>
<thead>
<tr>
<th>Return</th>
<th>Probability</th>
<th>$P_i$</th>
<th>$K_i$</th>
<th>$K_i - \bar{K}$</th>
<th>$(K_i - \bar{K})^2$</th>
<th>$P_i(K_i - \bar{K})^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4%</td>
<td>.20</td>
<td>.08</td>
<td>.8</td>
<td>-7</td>
<td>49</td>
<td>9.8</td>
</tr>
<tr>
<td>12%</td>
<td>.50</td>
<td>4.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>.5</td>
</tr>
<tr>
<td>-14%</td>
<td>.30</td>
<td>4.2</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\bar{K} = 11.0$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\sigma^2 = 13$

$\sigma = \sqrt{13} = 3.60555$

$CV = \frac{3.60555}{11} = .33$