AGEC $424$ EXAM 2 (129 points) Spring 2012

Name __________________________ Date ____________

Show your work for all questions. Logically correct work, including calculator inputs and outputs when appropriate, must be shown to receive credit for your answers. Do something to distinguish the output from the input. I may not have written “show your work here” on all the questions, but you still must show your work!

1. (6 points) Merritt Manufacturing needs to accumulate $20 million to retire a bond issue that matures in 13 years. The firm’s manufacturing division can contribute $100,000 per quarter to an account that will pay 8%, compounded quarterly. How much will the remaining divisions have to contribute every month to a second account that pays 6% compounded monthly in order to reach the $20 million goal?

Show work and give at least some indication of what you are doing

\[ \begin{align*}
\text{(1)} \quad \text{Manual, accumulation} & \quad \text{(2)} \quad \text{Net left} \\
N &= 13 \times 4 = 52 \\
I &= 8/4 = 2.00 \\
pmt &= 100,000 \\
PV &= 0 \\
FV &= 9,001,640.43 \\
\text{(3)} \quad \text{Pmt for other div} & \\
N &= 13 \times 12 = 156 \\
I &= 6/12 \\
PV &= 20,000000 \\
FV &= 10,998,359.47 \\
pmt &= 4,6,712.61
\end{align*} \]

2. a. (7 points) What is the monthly payment on a 5-year car loan of $30,000 at 4.25% interest compounded monthly? Show work

\[ \begin{align*}
N &= 60, \quad I = 4.25/12, \quad PV = 30,000, \quad PV = 0 \\
pmt &= 555.89 \\
FV &= 555.89
\end{align*} \]

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

<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>555.89</td>
<td>106.25</td>
<td>449.64</td>
<td>29,550.36</td>
</tr>
<tr>
<td>2</td>
<td>29,550.36</td>
<td>555.89</td>
<td>104.64</td>
<td>451.23</td>
<td>29,099.13</td>
</tr>
</tbody>
</table>

\[ 30,000 \times 0.0425/12 = 106.25 \]

\[ 29,550.36 \times 0.0425/12 = \]

3. (4 points) What is the most you should pay to receive the following cash flows if you require a return of 12 percent? Show work \[ CF_0 = 0 \]

Year 1 \[ CF_1 = 5,000 \]
Year 2 \[ CF_2 = 8,000 \]
Year 3 \[ CF_3 = 12,000 \]
Years 4-10 \[ CF_4 - CF_{10} \]

\[ \begin{align*}
& \frac{5000}{(1 + 0.12)^1} + \frac{8000}{(1 + 0.12)^2} + \frac{12000}{(1 + 0.12)^3} + \sum_{t=4}^{10} \frac{CF_t}{(1 + 0.12)^t} \\
\end{align*} \]

\[ CP + NPS = 68,169.08 \]
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%  \( N = 9 \quad I = 12\% \)

b. 11%  \( PV = -30,000 \quad PMT = 0 \quad FV = 83,190 \)

c. 10%  \( N = ? \quad I = 12.75\% \quad PMT = 0 \quad FV = 3,000 \)

d. 9%  \( PV = -1,000 \)

e. 12.75 years

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  \( N = ? \quad I = 9\% \quad PMT = 0 \quad FV = 3,000 \)

b. 10.00 years

c. 11.11 years

d. 12.75 years

e. 13.50 years

6. Adam Wilson just purchased a home and took out a $250,000 mortgage for 30 years at 8%, compounded monthly.

a. (3 points) How much is Adam’s monthly mortgage payment? Show work

\[
\begin{align*}
I &= 8/12 = 0.67\% \quad PV = -250,000 \quad FV = 0 \\
N &= 360 \quad PMT = 1,834.41
\end{align*}
\]

b. (3 points) How much sooner would Adam pay off his mortgage if he made an additional $100 payment each month? Show work

\[
\begin{align*}
N &= ? \quad I = 8/12 \quad PV = -250,000 \quad PMT = 1,934.41 \quad FV = 0 \\
360 - 297.62 &= 62.38 \text{ months}
\end{align*}
\]

c. (3 points) Assume Adam makes his normal mortgage payments and at the end of five years, he refinances the balance of his loan at 6%. If he continues to make the same mortgage payments, how soon after the first five years will he pay off his mortgage? Show work

\[
\begin{align*}
N &= 5 \quad I = 8/12 \quad PV = -250,000 \quad PMT = 1,834.41 \quad FV = 237,674.75 \\
\text{How soon?} \quad N = ? \quad I = 6/12 \quad PV = -237,674.75 \quad PMT = 1,834.41 \quad FV = 0
\end{align*}
\]

7. (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%  \( (1.015)^{12} - 1 = 19.56\% \)

b. 18.64%

c. 19.56%

d. 29.74%

8. (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

\[
\begin{align*}
N &= 24 \quad I = 6/2 \quad PV = ? \quad FV = 1,000 \quad PMT = 50
\end{align*}
\]
9. 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
   \[ n = 20 \quad FV = 1000 \]
   \[ PV = -1185 \quad I \overset{?}{=} 4.169 \times 2 = 9.14\% \]
   \[ PMT = 60 \]
   b. (2 points) What is the current yield of this bond? Show work
   \[ \frac{120}{1185} = 10.13\% \]

10. (4 points) Assume the Thompson Tires bond above is callable in 5 years with a $50 call premium. What is the YTC? Show work
   \[ N = 10 \quad FV = 1050 \]
   \[ PV = -1185 \quad I \overset{?}{=} 4.197 \times 5 = 8.24\% \]
   \[ PMT = 60 \]

11. (4 points) Smith Barney 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
   \[ n = 2 \quad FV = 1100 \]
   \[ I = 3 \quad PV ? = 1151.66 \]
   \[ PMT = 40 \]

12. (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
   \[ P_0 = \frac{2 (1.06)}{1.10 - .06} = \frac{2.12}{.10} = \$53 \]

13. (12 points) The Miller Milk Company has just come up with a new lactose free dessert product for people who can’t eat or drink ordinary dairy products. Management expects the new product to fuel sales growth at 30% for about two years. After that competitors will copy the idea and produce similar products, and growth will return to about 3% which is normal for the dairy industry in the area. Miller recently paid an annual dividend of $2.60, which will grow with the company. The return on stocks like the Miller Company is typically around 10%. What is the most you would pay for a share of Miller? Show work
   \[ D_0 = 2.60 \quad D_1 = 3.38 \quad D_2 = 4.34 \quad D_3 = 4.528 \]
   \[ P_2 = \frac{4.528 \times 2}{.10 - .03} = 64.65 \]
   \[ CF_0 = 0 \]
   \[ CF_1 = 3.38 \]
   \[ CF_2 = 4.34 + 64.65 = 69.04 \]
   \[ I = 10 \]
   \[ CPT: \text{NPV} = \$60.13 \]
14. (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

\[ K_{F_{RM}} = 4 + 1.3(11 - 4) = 13.1\% \]

\[ P_0 = \frac{2(1.05)}{0.131 - 0.05} = \frac{2.10}{0.081} = 25.93 \]

15. (2 points) The underlying principles of portfolio theory include:
   a. diversifying business-specific risk away.
   b. basing decisions on stocks' risk/return characteristics in a portfolio context rather than on a stand-alone basis.
   c. getting the highest available return for the amount of risk the investor is comfortable with.
   d. all of the above

16. (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.

17. (2 points) The only component of the CAPM equation that relates specifically to a company is:
   a. \( \beta_x \)
   b. \( k_M \)
   c. \( k_{RF} \)
   d. \( (k_M - k_{RF}) \)

18. (3 points) If you invest 30% of your funds in AT&T stock with an expected rate of return of 10% and the remainder in GM stock with an expected rate of return of 15%, the expected return on your portfolio is:

Show work.

\[ 0.3(10\%) + 0.7(15\%) = 13.5\% \]

19. (3 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>

\[ 0.25 (1.15 + 1.05 + 1.50 + 0.50) = 1.05 \]

20. (2 points) The use of fixed-cost financing is referred to as:
   a. operating leverage.
   b. a leveraged buyout.
   c. financial leverage.
   d. combined leverage.
21. (2 points) The degree of financial leverage is measured by relating the percentage change in earnings per share to the percentage change in:
   a. sales.
   b. EBIT.
   c. debt ratio.
   d. share price.

22. (2 points) Financial leverage has the following effect on financial performance:
   a. During periods of reasonably good performance, leverage enhances results in terms of ROE and EPS.
   b. Leverage adds variability to financial performance making the firm’s stock a riskier investment.
   c. Leverage always makes performance better and thereby increases stock price.
   d. Both a and b

23. (6 points) Assume the following facts about a company:

<table>
<thead>
<tr>
<th>Capital</th>
<th>0% debt</th>
<th>40% debt</th>
<th>0% debt</th>
<th>40% debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>—</td>
<td>1200</td>
<td>EBIT</td>
<td>$1,000</td>
</tr>
<tr>
<td>Equity</td>
<td>$3,000</td>
<td>1800</td>
<td>Less Interest Expense</td>
<td>—</td>
</tr>
<tr>
<td>Total Capital</td>
<td>$3,000</td>
<td>3000</td>
<td>EBT</td>
<td>$1,000</td>
</tr>
<tr>
<td>Shares @ $10</td>
<td>300</td>
<td>180</td>
<td>Taxes @ 40%</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Earnings after Tax</td>
<td>$600</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. 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

24. (3 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
   a. 1.0
   b. 1.4
   c. 1.5
   d. 1.6

25. (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
   a. $10
   b. 40%
   c. 60%
   d. 67%

26. (3 points) Assume the following facts about a firm that sells just one product:
   Selling price per unit = $24.00  a. 417 units
   Variable costs per unit = $18.00  b. 1,250 units
   Total monthly fixed costs = $2,500  c. 5,000 units
   What is the firm’s annual breakeven volume in units? Show work
   d. 1,667 units
27. (3 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

   \[
   \text{DOL} = \frac{240000}{60000} = 4
   \]

28. (2 points) If a firm’s degree of operating leverage is 8, what percentage change in sales revenue is required to double the firm’s EBIT? **Show work**

   a. 100%
   b. 8%
   c. 12.5%
   d. none of the above

   \[
   8 \times \frac{100\%}{8} = 12.5\%
   \]

29. (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

   \[
   3 \times 20\% = 60\%
   \]

30. (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**

   \[
   \begin{align*}
   &\text{Return} \quad \text{Probability} \quad \frac{P(i-k)}{K} \quad \frac{K-i}{K} \quad \frac{(K-i)^2}{K} \\
   &4\% \quad .20 \quad \frac{.8}{6} \quad -7 \quad 49 \\
   &12\% \quad .50 \quad \frac{4.2}{6} \quad -3 \quad 9 \\
   &14\% \quad .30 \quad \frac{4.2}{6} \quad -3 \quad 9 \\
   \end{align*}
   \]

   \[
   \bar{K} = 11.09% \\
   \sigma^2 = 13.0 \\
   \sigma = \sqrt{13} = 3.61 \\
   \text{CV} = \frac{3.61}{11} = .33
   \]