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. I did not write “show your work here” on the questions, but you still must show your work!

1. (8 points) 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.

a. How much will she have to invest each year in order to achieve her objective?

Step 1
Find PMT

\[ \text{Step 2} \]

\[ \begin{align*}
N & = 5 \\
I & = 7 \\
PV & = -20000 \\
FV & = 1,425,972.36 \\
PMT & = ?
\end{align*} \]

From

Deposit 13,484.19 per year

b. What percent of the $2 million will have been contributed by Janet (including the $20,000 she got from her uncle)?

\[ \frac{20000 + 30(13484.19)}{2,000,000} = \frac{424525.7}{2,000,000} = 0.2122 = 21.22\% \]

2. What are the monthly mortgage payments on a 30-year loan for $150,000 at 8% compounded monthly?

a. (6 points) Show work and calculate the monthly payment to the penny

\[ \begin{align*}
N & = 30 \times 12 = 360 \\
I & = \frac{8}{12} \\
PV & = 150000 \\
PMT & = \text{?} \\
FV & = 0
\end{align*} \]

\[ \text{Payment} \approx 1100.65 \]

b. (10 points) Construct an amortization table for the first two months of the loan.

<table>
<thead>
<tr>
<th>Month</th>
<th>Beg Bal</th>
<th>Payment</th>
<th>Interest</th>
<th>Prin. Reduction</th>
<th>End Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150000</td>
<td>1100.65</td>
<td>1000.00</td>
<td>100.65</td>
<td>149899.35</td>
</tr>
<tr>
<td>2</td>
<td>149899.35</td>
<td>1100.65</td>
<td>999.33</td>
<td>101.32</td>
<td>149798.03</td>
</tr>
</tbody>
</table>

Interest \[150000 \times .08/12 = 100.00\]

\[149899.35 \times .08/12 = 999.33\]
3. (3 points) First Bank offers you a car loan at an annual interest rate of 10% compounded monthly. What effective annual interest rate is the bank charging you?
   a. 10.38% 
   b. 10.42% 
   c. 10.45% 
   d. 10.47%

4. (3 points) Your bank balance is exactly $10,000. Three years ago you deposited $7,938 and have not touched the account since. What annually compounded rate of interest has the bank been paying?
   \( n = 3 \) 
   \( PV = -7,938 \) 
   \( FV = 10,000 \) 
   \( I = 8.00\% \) 
   \( PMT = 0 \)

5. (3 points) Ralph has decided to put $2,400 a year (at the end of each year) into an IRA over his 40 year working life and then retire. What will Ralph have at retirement if the account earns 10 percent compounded annually?
   \( n = 40 \) 
   \( PMT = 2,400 \) 
   \( FV = 1,062,222.13 \)

6. (3 points) Assume that you have just won "$5,000,000" in the lottery and will receive $250,000 per year for the next 20 years. How much is your prize worth today if the interest rate is 8%?
   \( n = 20 \) 
   \( PV = 2,454,536.85 \) 
   \( FV = 0 \) 
   \( I = 8 \) 
   \( PMT = 250,000 \) 
   (Worth 2,454,536.85)

7. (5 points) J&J Manufacturing issued a bond with a $1,000 par value. The bond has a coupon rate of 7% and makes payments semiannually. If the bond has 30 years remaining and the annual market interest rate is 9.4%, what will the bond sell for today?
   \( n = 60 \) 
   \( PV = -760.41 \) 
   \( FV = 1000 \) 
   \( I = 9.4%/2 = 4.7 \) 
   \( PMT = 70/2 = 35 \) 
   (Sell for 760.41)

8. (5 points) Wildman Products Inc. has an outstanding semiannual, 9% coupon, $1000 face value bond priced at $1075. The bond has 5 years to maturity. What is this bond’s YTM?
   \( n = 10 \) 
   \( PV = -1075 \) 
   \( FV = 1000 \) 
   \( I = 3.59 \times 2 = 7.18\% \) 
   \( PMT = 45 \)

9. (4 points) If a 30-year, $1,000 bond has a 9% coupon and is currently selling for $826, its **current yield** is:
   \[ \frac{90}{826} = 10.9\% \]
10. (5 points) Jake’s Inc. has an outstanding semiannual, 13% coupon, $1000 face value bond that is selling for $1185 and has 10 years to maturity. What is the YTM?

\[ n = 20 \quad FV = 1000 \quad PV = -1185 \]

\( I = 5.01 \times 2 = 10.02\% \quad Pmt = 130/2 = 65 \)

11. (5 points) Find the yield to call on a semiannual coupon bond with a face value of $1000, a 10% coupon rate, and 15 years remaining until maturity given that the bond price is $1175 and it can be called 5 years from now at a call price of $1100.

\[ n = 10 \quad FV = 1100 \quad PV = -1175 \]

\( I = 3.716(2) = 7.43\% \quad Pmt = 50 \)

12. (5 points) Undue Perversity Inc. has a 10 year, callable, semiannual, $1000 face value, 12% coupon bond for sale. It is callable in 3 years 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?

\[ n = 6 \quad FV = 1100 \quad PV = -1246.26 \]

\( I = 3 \quad Pmt = 60 \quad Bond\ is\ worth\ 1246.26 \)

13. (5 points) The Pancake Corporation recently paid a $3 dividend, and is expected to grow at 5% forever. Investors generally require an expected return of at least 9% before they'll buy stocks similar to Pancake. What is Pancake’s intrinsic value?

\[ P_0 = \frac{3(1.05)}{.09 - .05} = 3.15 \times \frac{104}{104} = \$78.75 \]

14. (5 points) Sharbaugh Inc.’s most recent dividend was $2.00 per share. The dividend is expected to grow at a rate of 4% per year for the foreseeable future. If the market return is 13% on investments with comparable risk, what should the stock sell for today?

\[ P_0 = \frac{2(1.04)}{113 - .04} = \frac{2.05}{.09} = \$23.11 \]

15. (14 points) Cantaloupe Growers Corp. is expanding into a new geographic area. Management expects the new market to fuel growth of 22% for three years. After that normal growth of 6% will resume. Cantaloupe’s most recent annual dividend was $1.25. Other fruit companies have been returning about 12% lately. How much should a share of Cantaloupe be worth?

\[ CF_0 = 0 \]
\[ CF_1 = 1.53 \]
\[ CF_2 = 1.86 \]
\[ CF_3 = 42.37 \]

\[ I = 12 \]

\( Comp.\ NPV = \sum_{t=1}^{3} \frac{CF_t}{(1 + 0.12)^t} = 40.10 \)

\[ P_B = \frac{2.4059986}{0.12 - 0.06} = 40.10 \]
16. (4 points) Elephant Company common stock has a beta of 1.2. The risk-free rate is 6 percent and the expected market rate of return is 12 percent. Determine the required rate of return on the security.

\[ R = R_f + \beta (R_m - R_f) = 13.2\% \]

17. (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.

\[ K_s = 4 + 1.3 \times (11 - 4) = 13.1\% \]
\[ P_0 = \frac{2 (1.05)}{1.13 - 0.05} = \frac{2.10}{0.081} = \$25.93 \]

18. (2 points) Stocks that have high financial rewards are generally accompanied by:
   a. high dividend payments.
   b. low dividend payments because of internally generated growth.
   c. high risk.
   d. all of the above

19. (2 points) Risk in finance:
   a. is variability in return.
   b. can be decomposed into business-specific and market components.
   c. will be accepted by some investors if higher expected returns are offered in compensation.
   d. all of the above

20. (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

21. (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.

22. (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
23. (3 points) Assume the following facts about a single product firm:

Selling price per unit = $25.00  
Variable costs per unit = $20.00  
Total annual fixed costs = $30,000

What is the firm’s annual breakeven volume in sales revenues?

a. $6,000  
b. $250,000  
c. $150,000  
d. $1,500

\[ BEQ = \frac{30,000}{5} = 6,000 \]

\[ BE \text{ Sales} = 6,000 \times 25 = \boxed{150,000} \]

24. (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)?

\[ DOL = \frac{(15-9)(40,000)}{(15-9)40,000 - 180,000} = \frac{240,000 - 180,000}{40,000 - 180,000} = \boxed{4} \]

25. (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)?

\[ DFL = \frac{\text{EBIT} + \text{Interest}}{\text{EBIT} \times (1 - \text{Tax Rate})} = \frac{3.6}{2.4} = \boxed{1.5} \]

26. (3 points) Illinois Tool Company’s 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.

\[ \% \Delta EPS = 3 \times 20 = \boxed{60\%} \]

27. (3 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?

\[ DFL = \frac{1500}{1500 - 12(5000)} = \frac{1500}{900} = 1.6666 \]

\[ \% \Delta EPS = 1.666 \times -20 = -33.33\% = -\frac{1}{3} \]

\[ 2.35 - \frac{1}{3} 2.35 = \frac{2}{3} 2.35 = \boxed{1.57} \]
<table>
<thead>
<tr>
<th>$K_i$</th>
<th>$P_i$</th>
<th>$K_iP_i$</th>
<th>$K_i - \hat{K}$</th>
<th>$(K_i - \hat{K})^2$</th>
<th>$P_i(K_i - \hat{K})^2$</th>
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</thead>
<tbody>
<tr>
<td>.12</td>
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<td>.06</td>
<td>.01</td>
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<td>.042</td>
<td>.103</td>
<td>.0009</td>
<td>.00027</td>
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</table>

$\hat{K} = .116$

$\sigma^2 = .0013$

$\sigma = \sqrt{.0013} = .036$

$CV = \frac{.036}{.11} = .33$