Name: _____

Econ 135: Corporate Finance
Midterm Exam 1 – Answer key

Multiple Choice Questions (12 points)
Circle the right answer. Each question is worth 2 points.

1) A loan where the borrower pays interest each period, and repays some or all of the principal of the loan over time is called a(n) _____ loan.
   A) amortized
   B) continuous
   C) balloon
   D) pure discount
   E) interest-only

2) A bond sold five weeks ago for $1,200. The bond is worth $1,040 in today's market. Assuming no changes in risk, which of the following is FALSE?
   A) The bond has less time to maturity today than it did five weeks ago.
   B) The bond has a smaller premium today than it did five weeks ago.
   C) Interest rates must be higher now than they were five weeks ago.
   D) The bond's current yield has increased from five weeks ago.
   E) The coupon payment of the bond must have increased.

3) A current asset is:
   A) An item currently owned by the firm.
   B) An item that the firm expects to own within the next year.
   C) An item currently owned by the firm that will convert to cash within the next 12 months.
   D) The amount of cash on hand the firm currently shows on its balance sheet.
   E) The market value of all the items currently owned by the firm.

4) Interest earned on both the initial principal and the interest reinvested from prior periods is called:
   A) free interest
   B) annual interest
   C) simple interest
   D) interest on interest
   E) compound interest

5) Which of these methods does NOT reduce conflicts of interest?
   A) Separating the role of CEO and chairman
   B) Paying executives with stocks
   C) Paying executives with stock options
   D) Paying interest to bond holders before paying any dividends to shareholders
   E) Preventing external auditors from doing consulting work for the companies they audit

6) A stock's next expected dividend divided by the current stock price is the:
   A) Current yield.
   B) Total yield.
   C) Dividend yield.
   D) Capital gains yield.
   E) Earnings yield.

Numerical problems (30 points)

Please **show all calculations**. If you're stuck, **assume a solution** to get full credit on a later part.

1) *(7 pts.)* LimLop Inc.'s income statement and balance sheet are as follows:

Revenue	400		**Assets**		**Liabilities**	
COGS	300		Cash	100	Accounts payable	50
SG&A	50		Account receivable	150	Total current liabilities	70
EBIT	50		Inventory	150	Long-term debt	430
Interest	10		Total current assets	400	Paid-in capital	500
Taxes	10		Fixed assets	1300	Retained earnings	700
Net income	30		Total assets	1700	Total liabilities and equity	1700

a) *(2 pts.)* If the firm has an average tax rate of 25%, what is the net income?
Taxable income = EBIT – interest = 50 – 10 = 40.
Taxes = taxable income * average tax rate = 40 * 25% = 10

b) *(2 pts.)* What is the firm's ROE?
ROE = NI / Total equity = 30/1200 = 2.5%

c) *(3 pts.)* What are the 3 components of the DuPont analysis, with specific values for this company?
PM = NI/sales = 30/400 = 7.5%
TAT = Sales/Total assets = 400/1700 = 23.5%
EM = Total assets/Total equity = 1700 / 1200 = 1.42

2) *(9 pts.)* Biogenetics, Inc. plans to retain and reinvest all of their earnings for the next 30 years. At the end of year 31, the firm will begin to pay a $30 annual dividend, followed by a dividend of $31.20 at the end of year 32. Dividends will grow at the same rate forever.

a) *(2 pts.)* What's the expected growth rate of dividends?
$g = D_{32}/D_{31} - 1 = 31.20/30 - 1 = 4\%$

b) *(2 pts.)* Given a required return of 14%, what should the stock sell for in 30 years?
$P_{30} = D_{31}/(k-g) = \$30 / (.14 - .04) = \$300$

c) *(2 pts.)* What should the stock sell for today?
$P_0 = \$300 / 1.14^{30} = \$5.89$

d) *(1 pt.)* If the stock currently trades for $10, is it overvalued, undervalued, or fairly priced, and why?
Since $10 > $5.89, the stock is currently overvalued.

e) *(2 pts.)* What's the dividend yield in year 30?
$\text{Dividend yield}_{30} = D_{31}/P_{30} = 30/300 = 10\%$

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3) *(4 pts.)* LimLop Inc's bonds have a 6% coupon rate. The bonds have a maturity of 20 years. Similar bonds have a YTM of 5%.

   a) *(2 pts.)* What is the price of LimLop's bonds?
   Price = $30/ .025 [(1 - 1/1.025^{40})] + 1,000 / 1.025^{40} = $753.08 + $372.43 = $1,125.51

   b) *(2 pts.)* What's a good reason for a firm to raise money by issuing bonds instead of equity?
   Since interest is tax deductible, while dividends are not, issuing bonds reduces the tax liability of the firm.

4) *(6 pts.)* Suppose you buy a new Toyota for $25,000, paying nothing down. You agree to a repayment schedule of equal monthly payments over six years, beginning one month from today. The banker's required return is 10% APR.

   a) *(2 pts.)* How much will your monthly payments be?
   C = 25,000 (.10/12) / (1 - 1/(1+.10/12)^{72}) = $463.15

   b) *(2 pts.)* What is the outstanding balance on the loan after 24 months?
   PV = 463.15/(.10/12) [1 – 1/(1+.10/12)^{48}] = $18,261.15

   c) *(2 pts.)* What is the effective annual rate on the loan?
   EAR = (1+.10/12)^{12} – 1 = 10.47%

5) *(4 pts.)* Your spreadsheet looks like this:

	A	B	C	D	E	F	G
1	Discount rate	20%					
2	Year	0	1	2	3	4	5
3	Cash flow	-100	-20	20	30	30	50
4	Discount factor						
5	PV						

   a) *(2 pts.)* The discount factor is the number by which you multiply a FV to get its PV. What formula should you enter into cell B4 to define the discount factor, so that you can copy and paste that formula to all cells beside it, while being able to change the discount rate easily?
   =1/(1+$B1)^B2 or =1/(1+$B$1)^B2 or =1/(1+$B1)^B$2 or =1/(1+$B$1)^B$2

   b) *(2 pts.)* What formula should you enter into cell B5 to get the sum of PVs of all 6 cash flows?
   =sumproduct(B3:G3,B4:G4) or =B3*B4+C3*C4+D3*D4+E3*E4+F3*F4+G3*G4

Equation sheet

Cash flow calculations

OCF = EBIT + depreciation – taxes
OCF = (sales-costs)(1-T) + depreciation*T (without interest)
Net capital spending = Ending NFA – beginning NFA + depreciation
Change in NWC = Ending NWC – beginning NWC
CFFA = OCF – net capital spending – change in NWC
CF to creditors = interest paid – net new borrowing
CF to stockholders = dividends paid – net new equity raised

Some financial ratios

Current ratio = current assets / current liabilities
Quick ratio = (current assets – inventory)/current liabilities
Cash ratio = cash / current liabilities
Total debt ratio = (total assets – total equity) / total assets
Debt-equity ratio = total debt / total equity
Times interest earned ratio = EBIT/interest
Cash coverage ratio = (EBIT + depreciation) / interest
Inventory turnover = COGS / average inventory
Inventory period = 365 days / inventory turnover
A/R turnover = credit sales / average accounts receivable
A/R period = 365 days / accounts receivable turnover
A/P turnover = COGS / average accounts payable
A/P period = 365 days / accounts payable turnover
Operating cycle= inventory period + A/R period
Cash cycle = operating cycle – A/P period

Other equations

$$\text{Internal growth rate} = \frac{ROA * b}{1 - ROA * b}$$

$$\text{Sustainable growth rate} = \frac{ROE * b}{1 - ROE * b}$$

$$\text{Annuity PV} = \frac{C}{r}\left(1 - \frac{1}{(1+r)^t}\right)$$

$$\text{Perpetuity PV} = \frac{C}{r}$$

After-tax salvage = salvage – T_C*(salvage – book value)
Fisher effect: 1+r=(1+R)(1+h)

Stock valuation

$P_0=(D_1+P_1)/(1+k)$
Constant dividends: $P_0=D/k$

Dividend growth model: $P_t = \frac{D_t(1+g)}{k-g} = \frac{D_{t+1}}{k-g}$

Calculating returns and variability

Percentage return on stock: $R = D_{t+1}/P_t + (P_{t+1} - P_t)/P_t$

Historical

$$\bar{R} = \frac{1}{n}\sum_{i=1}^{n} R_i$$

$$\sigma^2 = \frac{1}{n-1}\sum_{i=1}^{n}(R_i - \bar{R})^2$$

$$\sigma = \sqrt{\sigma^2}$$

Expected

$$E(R) = \sum_{i=1}^{n} p_i R_i$$

$$\sigma^2 = \sum_{i=1}^{n} p_i (R_i - E(R))^2$$

$$\sigma = \sqrt{\sigma^2}$$

Portfolios

$$E(R_{Pi}) = \sum_{j=1}^{m} w_j E(R_{ij})$$

$$E(R_P) = \sum_{i=1}^{n} p_i E(R_{Pi})$$

$$\sigma^2 = \sum_{i=1}^{n} p_i (E(R_{Pi}) - E(R_P))^2$$

$$\beta_P = \sum_{j=1}^{m} w_j \beta_j$$

Capital market theory and the cost of capital

$$SML : E(R_M) - R_f = \frac{E(R_i) - R_f}{\beta_i}$$

$$CAPM : E(R_i) = R_f + \beta_i (E(R_M) - R_f)$$

$$WACC = \frac{E}{V} R_E + \frac{P}{V} R_P + \frac{D}{V} R_D (1 - T_C)$$

Value of financial leverage

PV of interest tax shield = $T_c D$

$$V_U = \frac{CFFA}{R}$$ if CFFA is constant forever

$$V_L = V_U + T_C D$$