Econ 135: Corporate Finance
Sample Midterm Exam 1 – Answer key

Multiple Choice Questions (10 points)
Each question is worth 2 points.

1) A bond's indenture specifies all of the following except
   A) The bond's coupon rate
   B) The bond's P/E ratio
   C) Time to maturity
   D) Seniority of the issue
   E) Total size of the issue

2) The rule of 72 specifies
   A) The percentage of dividends that are tax-exempt
   B) The number of periods used for compounding
   C) How long it takes to double some amount of money
   D) The relationship between TAT and PM
   E) None of the above

3) There is no major conflict of interests between
   A) Managers and shareholders
   B) Bondholders and shareholders
   C) Majority and minority shareholders
   D) Employees and shareholders
   E) The board of directors and shareholders

4) The goal of financial management is to maximize
   A) Revenue
   B) The firm's market share
   C) Profits
   D) The market value of equity
   E) The market value of assets

5) A loan where the borrower receives money today and repays a single lump sum at some time in the future is called a(n) _____ loan.
   A) amortized
   B) continuous
   C) balloon
   D) pure discount
   E) interest-only

Numerical problems (40 points)

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

1) *(8 pts.)* Luray Inc.'s income statement and balance sheet are as follows:

Revenue	258		**Assets**		**Liabilities**	
COGS	130		Cash	100	Accounts payable	50
SG&A	60		Account receivable	150	Total current liabilities	70
EBIT			Inventory	150	Long-term debt	400
Interest	10		Total current assets	400	Paid-in capital	530
Taxes	20		Fixed assets	1300	Retained earnings	700
Net income			**Total assets**	1700	**Total liabilities and equity**	1700

a) *(2 pts.)* What is the firm's net working capital?
Net working capital (NWC) = current assets – current liabilities = 400 – 70 = 330

b) *(3 pts.)* What is the firm's ROE?
EBIT = Revenue – COGS – SG&A = 258-130-60 = 68
Net income (NI) = EBIT – interest – taxes = 68 - 10 - 20 = 38
ROE = NI / Total equity = 38/1230 = 3.1%

c) *(3 pts.)* What are the 3 components of the DuPont analysis, with specific values for this company?
PM = NI/sales = 38/258 = 14.7%
TAT = Sales/Total assets = 258/1700 = 15.2%
EM = Total assets/Total equity = 1700 / 1230 = 1.38

2) *(6 pts.)* Your great uncle has left you an inheritance. The will stipulates that you'll receive $10,000 in 5 years and $20,000 in 10 years. Saving accounts offer a 3% interest rate.
a) *(2 pts.)* What is the present value of this inheritance?
$PV = \$10{,}000/1.03^5 + \$20{,}000/1.03^{10} = \$23{,}508$

b) *(2 pts.)* What is the value in 10 years?
$FV_{10} = \$10{,}000 * 1.03^5 + \$20{,}000 = \$31{,}593$
or $FV_{10} = \$23{,}508 * 1.03^{10} = \$31{,}593$

c) *(2 pts.)* What is the value in 8 years?
$FV_8 = \$23{,}508 * 1.03^8 = \$29{,}779$
or $FV_8 = \$10{,}000 * 1.03^3 + \$20{,}000/1.03^2 = \$29{,}779$

3) *(10 pts.)* You and your spouse have found your dream home. The selling price is $220,000; you will put $50,000 down and obtain a 30-year fixed-rate mortgage at 7.5% APR for the balance.

   a) *(2 pts.)* Assume that monthly payments begin in one month. What will each payment be?

   $PV_A = \$170,000 = C/ (.075/12) [1 - 1 / (1 + .075/12)^{360}]$; C = $1,188.66

   b) *(2 pts.)* How much interest will you pay (in nominal dollars) over the lifetime of the loan? (Assume you make each of the required 360 payments on time.)

   Total payments = $1,188.66 x 360 = $427,919; interest = $427,919 - 170,000 = $257,919

   c) *(2 pts.)* Although you will get a 30-year mortgage, you plan to prepay the loan by making an additional payment each month along with your regular payment. How much extra must you pay each month if you wish to pay off the loan in 20 years?

   30 year: C = $1,188.66 (see first part)
   20 year: PV = $170,000 = C $\{[1 - 1 / (1 + .075/12)240] / (.075/12)\}$; C = $1,369.51
   Extra payment = $1,369.51 - 1,188.66 = $180.85

   d) *(2 pts.)* Given the additional payments you make every month and assuming you made all payments on time, what is the outstanding balance after 10 years?

   The outstanding balance always equals the present value of all future payments:

   $PV_A = 1,369.51/ (.075/12) [1 - 1 / (1 + .075/12)^{120}] = \$115,374.$

   e) *(2 pts.)* How much of your monthly payment is interest after 10 years?

   Interest = outstanding balance * interest rate
   = $115,374

4) *(8 pts.)* Realtime Inc. plans to retain and reinvest all of their earnings for the next 5 years. At the end of year 6, the firm will begin to pay a $1 per share dividend, followed by a $2 dividend the year after. The dividend will increase by 2% annually thereafter. The required return is 14%.

   a) *(2 pts.)* What is the expected stock price at the end of year 7 (7 years from now)?

   $P_7 = D_8/(k-g) = \$2 (1.02) / (.14 - .02) = \$17$

   b) *(2 pts.)* What should the stock sell for today?

   $P_0 = \$1 / 1.14^6 + \$2 / 1.14^7 + \$17 / 1.14^7 = \$8.05$

   c) *(2 pts.)* What's the (current) dividend yield?

   $P_0 = D_1/(k-g) \Leftrightarrow k = D_1/P_0 + g$ = dividend yield + capital gains yield
   Dividend yield = $D_1/P_0 = 0/8.05 = 0$

   d) *(2 pts.)* What's the (current) capital gains yield?

   $g = k - D_1/P_0 = 14\%$

5) *(8 pts.)* King Noodles' bonds have a 9% coupon rate. The bonds have a maturity of 10 years.
   a) *(2 pts.)* If similar bonds have a YTM of 10%, what is the price of King Noodles' bonds?

   Price = $45 [(1 - 1/1.05^{20}) / .05] + 1,000 / 1.05^{20} = $937.69

   b) *(2 pts.)* Is this a discount, par or premium bond, and why?
   Since the price ($937.69) is less than the face value ($1,000), it's a discount bond.

   c) *(2 pts.)* What should be the price of the bond in 3 years, if market interest rates stay unchanged?
   In 3 years, the bond has 7 years to maturity, or 14 6-month periods.

   Price = $45 [(1 - 1/1.05^{14}) / .05] + 1,000 / 1.05^{14} = $445.43 + $505.07 = $950.51

   d) *(2 pts.)* In what direction would you expect the YTM to change if the bond was callable, and why?
   Since a callable bond allows the issuer to repay the bond before maturity whenever it's in the issuer's interest to do so, the bond is less attractive to investors. The price would thus be lower, which corresponds to a higher yield to maturity (YTM), given the inverse relationship between bond prices and yields.

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

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

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

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

Perpetuity PV $= \dfrac{C}{r}$

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: $P_t = \dfrac{D_t(1+g)}{k-g} = \dfrac{D_{t+1}}{k-g}$

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 $= T_c D$

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

$$V_L = V_U + T_C D$$