Name: _____

Econ 135: Corporate Finance
Midterm Exam 2 Sample – Answer key

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

1) Risk that affects a large number of assets, each to a greater or lesser degree, is called:
   a) Idiosyncratic risk.
   b) Diversifiable risk.
   c) Systematic risk.
   d) Asset-specific risk.
   e) Total risk.

2) The appropriate discount rate to be used when analyzing an investment project is
   _____.
   a) the rate of return that will result in the highest NPV
   b) the rate of return financial markets offer on investments of similar risk
   c) the internal rate of return on that investment
   d) equal to the cost of capital based on the firm's historical assets
   e) the rate of interest the firm would pay if it sold bonds

3) _____ refers to the net total cash flow of the firm accruing to its creditors and stockholders.
   a) Operating cash flow
   b) Capital spending
   c) Net working capital
   d) Cash flow from assets
   e) Cash flow to creditors

4) The excess return required on a risky asset over that earned on a risk-free asset is called (a):
   a) Risk premium.
   b) Return premium.
   c) Excess return.
   d) Average return.
   e) Variance.

5) The evaluation of a project based solely on its incremental cash flows is the basis of the:
   a) Incremental cash flow method.
   b) Stand-alone principle.
   c) Dividend growth model.
   d) After-tax salvage value analysis.
   e) Discounted payback method.

6) Net present value _____.
   a) is equal to the initial investment in a project
   b) is equal to the present value of the project benefits
   c) is equal to zero when the discount rate used is equal to the IRR
   d) is simplified by the fact that future cash flows are easy to estimate
   e) requires the firm set an arbitrary cutoff point for determining whether an investment is acceptable

Numerical problems

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

1) What is the expected return on asset A if it has a beta of 0.6, the expected market return is 15%, and the risk-free rate is 6%?
   E(R) = 6 + .6 (15 - 6) = 11.4%

2) *(4 pts.)* What is the before-tax cost of debt of a company that has two bonds outstanding?

Bond	Coupon rate	Years to maturity	YTM	Book value	Price	Market value	Weight
A	16%	25	12%	$10m	1,315.24	13.1524	39.67%
B	10%	15	10%	$20m	1,000.00	20	60.33%

$P_A = 80 [(1 - 1/1.06^{50}) / .06] + 1,000 / 1.06^{50} = 1,315.24$
$r_D = 39.67\% * 12\% + 60.33\% * 10\% = 10.79\%$

3) *(6 pts.)* You are examining two possible projects:

Project	Year 0	Year 1	Year 2	Year 3
A	-$700	$300	$300	$300
B	-$950	$400	$400	$450

   a) *(3 pts.)* With a payback cutoff of 2.5 years, which project is acceptable?
   A: recover $600 in 2 years + $100 in $100/300 = 0.33 years => 2.33 yrs.
   B: recover $800 in 2 years + $150 in $150/450 = 0.33 years => 2.33 yrs.
   Answer: both

   b) *(3 pts.)* If the discount rate is 12% and the firm has limited funds and bases its investment decisions on the profitability index, which project is better?
   Project A: PI = $(300/1.12 + 300/1.12^2 + 300/1.12^3)/700 = 720.55 / 700 = 1.029$;
   Project B: PI = $(400/1.12 + 400/1.12^2 + 450/1.12^3)/950 = 996.32 / 950 = 1.049$
   Based on the PI rule, project B is preferable.

4) *(25 pts.)* Your company is considering an investment in new manufacturing equipment. The equipment costs $220,000 and will provide annual cost savings of $50,000 at the end of each of the next 7 years. The equipment has an eight-year tax life and is depreciated straight to zero. Its market value is zero after 7 years. Assume the project is of approximately the same risk as the firm's existing operations. The firm's marginal tax rate is 35%. The following market data for your company is current:
   Common stock: 1 million shares outstanding, $40 per share, beta =1.3
   Bonds: 10,000 bonds outstanding, $1,000 face value each, 6% coupon rate,
                     4 years to maturity, market interest rate for similar bonds is 5%
   Market: Market risk premium = 4.5%, risk-free rate = 3.5%

   a) *(3 pts.)* What is the cost of equity?
   $R_E = 3.5\% + 1.3 (4.5\%) = 9.35\%$

   b) *(2 pts.)* What is the cost of debt (APR), before taxes?
   Before tax cost of debt: 5% (=YTM, or market interest rate)

   c) *(3 pts.)* What is the market value of each bond?
   $P=30/2.5\% [1-1/1.025^8] + 1,000/1.025^8 = 1,035.85$

d) *(5 pts.)* What is the weighted average cost of capital?
Market value of equity = 1 million x 40 = 40,000,000
Market value of debt = 10,000 x 1,035.85 = 10,358,500
Total market value = 40,000,000 + 10,358,500 = 50,358,500
WACC = 9.35% (40,000,000/50,358,500) + 5% (10,358,500/50,358,500)(1-35%) = 8.1%

e) *(3 pts.)* What is the after-tax salvage value of the equipment in year 7?
Book value in year 7 = 220,000/8 = 27,500
ATSV= 0 - .35 (0 – 27,500) = 9,625

f) *(3 pts.)* What are operating cash flows in each year?

Cost savings	50,000
- Depreciation	-27,500
= EBIT	22,500
- Taxes	-7,875
+ Depreciation	27,500
= OCF	42,125

g) *(3 pts.)* What are cash flows from assets in each year?

End of year	0	1	2	3	4	5	6	7
OCF		42,125	42,125	42,125	42,125	42,125	42,125	42,125
- NCS	-220,000							9,625
=CFFA	-220,000	42,125	42,125	42,125	42,125	42,125	42,125	51,750

h) *(3 pts.)* What is the NPV of the proposed project? Should the company go ahead?
NPV = -$220,000 + (42,125/.081) [(1 - 1/1.0817)] + 9,625/1.0817 = 4,150
Yes, the company should go ahead with the project.

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 = $T_c D$

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

$$V_L = V_U + T_C D$$