721957S FUNDAMENTALS OF FINANCE 11.12.2014

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All the answers on these sheets only!

Allowed material:
– calculator of any kind
– one sheet of student's own notes

1. Calculate the following interest rates.

a) Annually compounded two-year rate is 3.500%. Express the two-year rate in terms of continuous compounding.

b) Continuously compounded three-year rate is 6.300%. Express the three-year rate in terms of semiannual compounding.

c) Continuously compounded six-month rate is 3.500%, and the 6m $\times$ 12m simple six-month forward rate is 4.000%. Determine the one-year rate in terms of continuous compounding.

d) Four-year discount factor is 0.85214. Determine the four-year discount rate in terms of continuous compounding.

2. An interest rate swap is paying 3.425% fixed swap rate annually over the remaining time-to-maturity of three years and nine months. Correspondingly, the floating-leg of the swap pays semiannually with a reference to the six-month Euribor rate. The nominal principal (face value) of the swap is 10 million euros. The next fixed-leg payment of the swap is to take place nine months from now, whereas the next floating-leg payment is to take place three months from now. The rate to be applied in the next floating-leg payment was reset three months ago, and is 2.250%. With the current interest rates, the continuously compounded yield-to-maturity of the swap's fixed-leg is 3.275%. The current three-month and six-month Euribor rates are 2.125% and 2.255%, respectively.

a) The fixed-leg annual interest payment is...

b) The total present value of all remaining fixed-leg interest payments and the nominal principal is...

c) The duration of the fix-leg is...

d) If interest rates rise by 0.5 percentage units (in terms of continuous compounding), the duration predicts the fixed-leg value to change by...

e) The next semiannual floating-leg payment is...

f) The total present value of all remaining floating-leg interest payments and the nominal principal is...

g) The duration of the floating-leg is...

h) If interest rates rise by 0.5 percentage units (in terms of continuous compounding), the duration predicts the floating-leg value to change by...

h) The current value of the swap (paying fixed and receiving floating rate) is...

i) If interest rates rise by 0.5 percentage units (in terms of continuous compounding), the duration predicts the swap value to change by...

3. The table below provides the expected returns $E(R_i)$ and the volatilities σ_i of three asset ($i = 1, 2, 3$), as well as the weights w_i of them in three different portfolios ($p = A, B, C$). The table also provides the volatility σ_p of one of the three portfolios.

			Portfolio A	Portfolio B	Portfolio C
i	$E(R_i)$	σ_i	w_i	w_i	w_i
1	0.0823	0.2893	0.705	0.624	0.360
2	0.1310	0.4406	0.026	0.103	0.362
3	0.1062	0.4042	0.269	0.273	0.278
σ_p					0.2712
Minimum variance portfolio			☐	☐	☐
Required rate of return portfolio			☐	☐	☐
Tangent portfolio			☐	☐	☐

a) Indicate (tick the appropriate box in the table) which of the portfolios represents i) the minumum variance portfolio, ii) the required rate of return portfolio (the portfolio with the lowest variance at a given 9-percent level of expected return), and iii) the tangent portfolio.

b) Suppose that there is a possibility to borrow at the risk-free rate of 4%. Create such a portfolio of the three assets and the risk-free asset, which provides the highest possible expected return at the volatility level of 40%. What is the expected return of the portfolio?

4. The performance of a portfolio of 40 stocks is evaluated over a ten-year period of monthly data. The average *monthly* excess return of the portfolio is 1.0% wheras the volatility of the excess return (*i.e.* the *annualized* excess return standard deviation) is 20%.

a) Calculate the Sharpe's ratio of the portfolio.

b) Caclulate the t-statistic for the null-hypothesis that the ratio does not differ from zero.

5. The attached tables include the latest income statement and the balance sheets of MBA Corporation. Also, the projected income statements, capital investment budget, and net working capital budget over the period 2015-2018 are provided. In the projections, it is assumed that the *Net Sales*, *Costs of goods sold*, *Depreciation*, and *Capital expenditures* are to grow at a 10% annual rate over a two-year period 2015-2016. Thereafter the growth rate is expected to stabilize at a constant level of 5%. Regarding working capital requirement, the projections assume that 10% of annual *Net sales* appear in the balance sheet in terms of current assets. Similarly, 10% of annual *Costs of goods sold* appear as current liabilities. The required rate of return on assets of the MBA Corporation is estimated on the basis of an approximated unlevered beta, and is found to be 8.5% in terms of annual compounding.

a) Calculate the present values of the unlevered free cash flows from years 2015–2017.

b) Calculate the present value of all future cash flows beginning from year 2018.

Income statement	**2014**
Net sales	1010
Costs of goods sold	650
Deprecation	200
Earnings before interest and taxes	160
Interest paid	60
Taxes	35
Net income	65

Balance sheet	**2013**	**2014**
Current assets		
Cash	200	200
Other current assets	92	101
Fixed assets	1600	1650
Current liabilities	59	65
Long-term debt	850	880
Retained earnings	183	206
Stockholders' equity	800	800

Budget	**2015**	**2016**	**2017**	**2018**
Net sales	1111.00	1222.10	1283.21	1347.37
Costs of goods sold	715.00	786.50	825.83	867.12
Depreciation	220.00	242.00	254.10	266.81
Earnings before interest and taxes	176.00	193.60	203.28	213.44
Capital expenditures	275.00	302.50	317.63	333.51
Change in Net working capital	3.60	3.96	2.18	2.29