Course : **Final Examination Introduction to Investment Theory**
Code : 191515603
Date : November 09, 2011

All answers must be motivated
You may use an electronic calculator
Answers may be written in English or Dutch
Lots of success !

1. (a) Suppose two competing projects have cash flows $(-4, 3, 3)$ and $(-3, 2, 2)$. Show that the first project has a higher internal rate of return (IRR) than the second project.

   (b) Suppose the two competing projects have cash flows $(-A_1, B_1, \ldots, B_1)$ and $(-A_2, B_2, \ldots, B_2)$, both running from $k = 0$ to $k = n$. Suppose $B_1/A_1 > B_2/A_2$. Show that the project 1 has a higher IRR than project 2.
   (Hint: Prove by contradiction).

2. A two-year bond with a yield of 11% per year (par 100) pays a 8% coupon at the end of each year.

   (a) What is the bond's price?

   (b) What is the bond's duration?

   (c) Use the (modified) duration to calculate the effect on the bonds price of a 0.2% decrease in its yield.

3. The security market line relating random rate of return r_P of a portfolio of 3 assets to the market rate of return r_M is given by:

$$r_P = r_f + \beta_P(r_M - r_f) + \sum_{i=1}^{3} w_i e_i$$

where w_i is the weight of asset i in the portfolio. We assume $E(e_i) = 0$ and $E(e_i e_j) = 0$ for $i \neq j$. One year ago an investor put 45% of his money in share X, 35% in share Y and 20% in share Z. Actual returns over last year, together with risk characteristics of the three shares are given below:

Share	Actual return (%)	β	Specific risk (%)
X	0	0.6	30
Y	30	1.2	60
Z	10	0.8	25

   (a) Calculate the fraction of the portfolio currently invested in each share.

   (b) What is the portfolio β at present?

(c) What are the specific risk and the total risk (sum of systematic risk and specific risk) of the portfolio at present? (The standard deviation of returns of the market index is 20%).

4. An airline expects to purchase 2 million gallons of fuel in 1 month and decides to use (the more liquid) heating oil futures for hedging. Historical studies indicate that the monthly fluctuations of the price of jet fuel per gallon and futures prices of the heating oil are correlated, with the correlation coefficient 0.9. The standard deviations of these fluctuations have been calculated to be 0.03 and 0.025, respectively. Each heating oil contract is on 42,000 gallons of heating oil. How many heating oil contracts (rounded off to whole number) in the heating oil futures should the airline buy/short for minimum variance hedging?

Points:

1	a	:	2	2	a	:	2	3	a	:	2	4	:	5
	b	:	3		b	:	2		b	:	2			
					c	:	1		c	:	4			

Total: 23 + 2 bonus points = 25 points