YLIOPISTOTENTTI - UNIVERSITY EXAM

Opiskelijan nimi / Student name:	Opiskelijanumero / Student number:

Opettaja täyttää / Lecturer fills in:

Opintojakson koodi and nimi / The code and the name of the course:	
721957S **Fundamentals of finance**	
Oulu Business School	
16.1.2017	**3 h**
Exam 3	**6 cu**
Jukka Perttunen	

Sallitut apuvälineet / The devices allowed in the exam:

☒ Nelilaskin / Standard calculator   ☒ Funktiolaskin / Scientific calculator   ☒ Ohjelmoitava laskin / Programmable calculator

☐ Muu materiaali, tarkennettu alla / Other material, specified below:

Tenttiin vastaaminen / Please answer the questions:

☒ Suomeksi / in Finnish   ☒ Englanniksi / in English

Suomenkielisessä tutkinto-ohjelmassa olevalla opiskelijalla on oikeus käyttää arvioitavassa opintosuorituksessa suomen kieltä, vaikka opintojakson opetuskieli olisi englanti. Tämä ei koske vieraan kielen opintoja. (Kts. Koulutuksen johtosääntö 18 §)

In a Finnish degree programme a student has a right to use Finnish language for their study attainment, even though the language of instruction is English, (excluding language studies) even when the language of instruction is other than Finnish. (See the Education Regulations 18 §)

Kysymyspaperi on palautettava / Paper with exam questions must be returned:

☐ Kyllä / Yes   ☒ Ei / No

1. Solve the following interest rate transformations.

   a) The current six-month simple interest rate is 2.587%.
      Determine the corresponding continuously compounded interest rate.

   b) The current annually compounded four-year interest rate is 3.252%.
      Determine the corresponding continuously compounded interest rate.

   c) The current semiannually compounded five-year interest rate is 3.643%.
      Determine the corresponding continuously compounded interest rate.

   d) The current annually compounded six-year interest rate is 4.254%.
      Determine the corresponding semiannually compounded interest rate.

2. The six-month Euribor rate and the three-year Euribor swap rate (3y/6m) are quoted at 2.400% and 3.000%, respectively. The yield-to-maturity of the fixed leg of the swap is 2.956% in terms of continuous compounding. The swap is just launched, pays the fixed swap rate agains the receiving of the floating six-month Euribor rate, and trades currently at it's par value of €1000.

   a) Determine the duration of the fixed leg of the swap.

   b) Determine the duration of the floating leg of the swap.

   c) On the basis of duration, how much the value of the swap changes, if interest rates rise by 0.25 percentage units in terms of continuous compounding?

3. Three stocks together form a tangent portfolio corresponding to the risk-free rate of 2.0%. The annual expected returns, the annual variances/covariances, the tangent-portfolio weights, and the current prices of the stocks are reported in Table 1.

   a) Determine the expected return and the volatility of the tangent portfolio.

   c) Determine the expected return and the volatility of a portfolio, where 25% of the total capital of €1 million is invested in the risk-free asset, and the remaining 75% in the tangent portfolio.

   d) Determine the number of shares of each of the stocks in the portfolio in c).

4. Table 2 reports the daily returns of a portfolio, the daily returns of the market portfolio, and the corresponding preceding-period market model parameter estimates, over a five-day period.

   a) Calculate the cumulative market-adjusted abnormal return over the five-day period.

   b) Calculate the cumulative risk-adjusted abnormal return over the five-day period.

5. The unlevered free cash from the previous year is 200 thousand euros. The cash flow is expected to grow at a 10% annual rate over the next two years. From the beginning of the third year the growth rate is expected to stabilize at the level of 5%. The required rate of return on assets is 12% in terms of annual compounding, and the debt-to-equity ratio of the firm is 1.5.

   a) Determine the market value of the firm.

   b) Determine the market value of equity of the firm.

Table 1.

Stock	Price	w	$E(R)$	Variances/covariances		
				1	2	3
1	12.50	0.42	0.16	0.2200	0.0440	0.0260
2	8.00	0.26	0.08	0.0440	0.1400	0.0320
3	18.75	0.32	0.10	0.0260	0.0320	0.0800

Table 2.

Day	1	2	3	4	5
Portfolio return	−0.03347	0.01561	−0.00455	0.01212	0.02068
Market return	−0.00117	−0.00848	0.01525	−0.00458	−0.00472
Alpha	0.000	0.000	0.000	0.000	0.000
Beta	0.825	0.825	0.825	0.825	0.825

$$E(R_p) = \sum_{i=1}^{n} w_i E(R_i)$$

$$Var(R_p) = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij}$$

$$\sum_{t=1}^{\infty} \frac{(1+g)^t D_0}{(1+k)^t} = \frac{(1+g)D_0}{k-g} = \frac{D_1}{k-g}$$

$$r_c = \frac{\ln(1 + r\Delta t)}{\Delta t}$$

$$r = \frac{e^{r_c \Delta t} - 1}{\Delta t}$$

$$AR_i = R_i - R_m$$

$$AR_i = R_i - (\hat{\alpha}_i + \hat{\beta}_i R_m)$$

$$B = Ce^{-yt_1} + Ce^{-yt_2} + Ce^{-yt_3} + ... + (F + C)e^{-yT}$$

$$D = t_1 \frac{Ce^{-yt_1}}{B} + t_2 \frac{Ce^{-yt_2}}{B} + t_3 \frac{Ce^{-yt_3}}{B} + ... + T \frac{(F + C)e^{-yT}}{B}$$

$$\Delta B = -D \times B \times \Delta y$$