School of Business and Economics

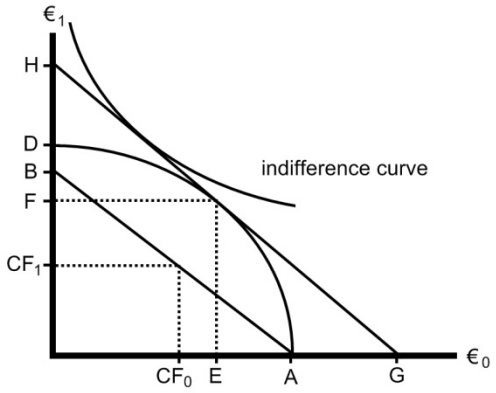
Exam:	Finance	Version A
Code:	E_IBA2_FIN	
Examinator:	Dr. M.B.J. Schauten	
Co-reader:	Prof. Dr. M.J. van den Assem	
Date:	20 December 2017	
Time:	15:15 – 17:15 hrs	
Duration:	2,0 hours	
Calculator allowed:	Yes	
Graphical calculator allowed:	No	
Number of questions:	19	
Type of questions:	16 multiple choice and 3 open	
Answer in:	English	
Remarks:	Answer the **multiple choice questions** by filling the corresponding box on the mc-answering form. Only one answer is correct (a, b, c or d). If you give more than one answer or no answer then your response is counted as wrong. The answers to the **open questions** should be given in the space below the open questions. There is more than enough space for your answers. Numbers are in European (Dutch) format with decimal commas, and dots separating thousands (e.g. 1.234.567,89). **Write your name on both the mc-answering form and on this exam form. At the end of the exam you hand in the mc-answering form and the exam form with the supervisor**.	
Credit scores:	The maximum score for the mc questions is 72 points. To determine the score we take into account the expected number of correct answers when answers are given randomly. The maximum score for the open questions is 18 points. The final grade for this exam is: [total number of points + 10] / 10.	
Grades:	At the latest the grades will be made public on 17 January 2018.	
Inspection:	Will be announced via Canvas.	
Number of pages:	13 (including front page)	

Name : _____

Student number : _____

Part A: Multiple Choice questions (72 points)

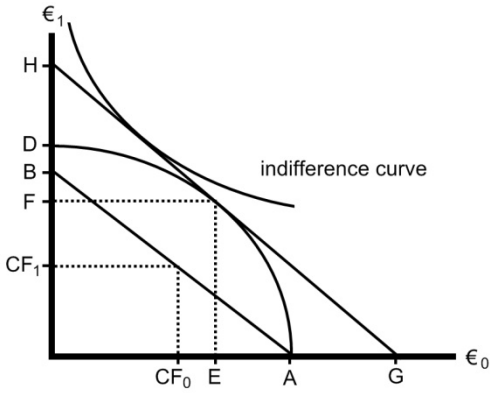
1.
Assume a world according to the Hirshleifer model. The income of Duyvestein at t = 0 and t = 1 (CF_0 and CF_1) is equal to € 93,60 and € 91,52 respectively. The risk free interest rate is 4,00%. At t = 0 Duyvestein lends € 45,00 and invests €35,00 (EA). At t = 1 the revenue of the investment is €62,40 (OF). Consider the figure below (not drawn to scale).



Question: Which of the following statements about Duyvestein is **false**?

a. The consumption at t = 1 is €200,72 (C_1).
b. The interest received at t = 1 is €1,80.
c. The net present value of the projects is €25,00 (AG).
d. The total wealth at t = 0 is €208,60 (OG).

2.
Assume a world according to the Hirshleifer model. Marcus owns a shop in Amsterdam from which he earns €1.400,00 at t = 0 (CF_0). At t = 1, he expects to have an income of €618,00 (CF_1). Marcus wants to expand and invests €1.000,00 in a new shop in Heiloo at t = 0.
At t = 1 Marcus consumes €2.369,00 and receives €12,00 in interest. The risk free interest rate is 3,00%. Consider the figure below (not drawn to scale).



Question: At t = 1 the revenue of the investments (OF) is closest to

a. €1.300,00
b. €1.339,00
c. €1.431,70
d. €1.442,00

3.
Assume that an investment project requires €30.000,00 (at t = 0) and that the economic life span is 2 years. The residual value is €0,00. There are no taxes. The expected cash flow at the end of year 1 and 2 is € 16.500,00 and €24.200,00 respectively. The required rate of return (r) is 10,00%.

Question: Which of the following statements is **true**?

a. There is insufficient data available to calculate the internal rate of return of this project.
b. There is sufficient data available to calculate het net present value of this project.
c. The internal rate of return of this project is lower than the required rate of return.
d. De profitability index of this project is higher than 2,00.

4.

Entrepreneur A has the possibility to invest in project B. The expected cash flows in euros before tax are shown in Table 1. The applicable corporate tax rate is 25,00%. Ignore other taxes. The investment of €100,00 is depreciated on a straight-line basis to zero in 2 years. The discount rate is 10,00%.

Table 1: Expected cash flows before tax of project B

CF_t	Amount in euros
CF_0	-100,00
CF_1	72,00
CF_2	96,00

Question: The net present value of the project is closest to

a. - €60,01
b. - €56,50
c. €30,29
d. €34,72

5.

You have just completed your education and need money for a well-deserved vacation. Your rich brother is willing to lend you money, but only if you fully repay the amount within four years, including the interest he would otherwise have received (3,00% on an annual basis). According to you, it is not possible to pay anything at the end of year 1, but at the end of year 2, 3 and 4 this is possible. At the end of year 2 you expect to be able to pay back €1.000,00 and at the end of year 3 and 4 each time €2.500,00.

Question: The amount that you could borrow from your brother at t = 0 is the closest to

a. €5.452
b. €5.480
c. €5.615
d. €5.820

6.

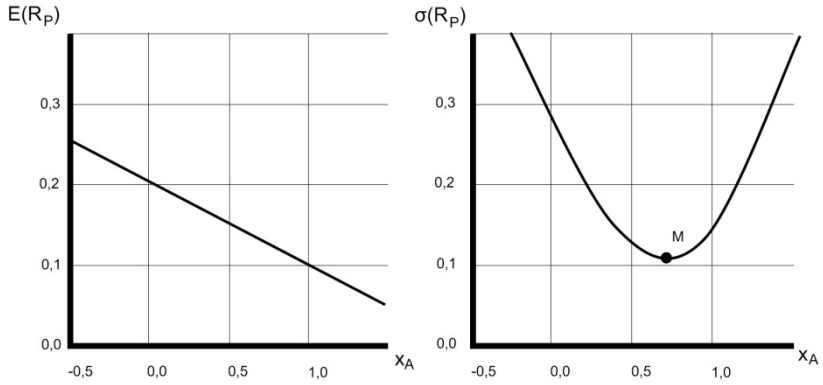
Company CARTOUCHE considers to invest €30.000 (at t = 0) in a new project. The expected cash flows before corporate tax (measured in nominal terms) at the end of year 1 and 2 are €20.000,00 and €25.000,00 respectively. The investment of €30.000,00 will be depreciated straight-line in 2 years to zero on the basis of historical cost. The corporate tax rate is 25,00%. The real cost of capital is 10,00%. The expected inflation is 2,00%.

Question: The net present value of the project is closest to

a. €4.584
b. €5.584
c. €5.640
d. €7.684

7.

Consider a world in which the assumptions of the portfolio theory hold. In this world only two risk-bearing securities, A and B, are traded.



Consider the two figures above. The left figure shows the expected returns and the right figure shows the standard deviation of the returns for various portfolios consisting of securities A and B. The fraction of the portfolio invested in security A is represented by x_A.

Question: If short selling is not allowed, the risk expressed in the standard deviation of the return for the portfolio with the lowest level of risk is closest to

a. 11%
b. 15%
c. 20%
d. 28%

8.

Entreprise XLS Properties B.V. has the opportunity to invest in two projects. The projects are mutually exclusive. Each project can be executed only once. The expected cash flows in euros and the net present values of both projects are presented in the table below. The cost of capital of project A is equal to that of B.

Table 1: Expected cash flows and NPV of project A and B in euros

t =	0	1	2	3	4
CF_t Project A	-100,00	0	0	0	300,00
CF_t Project B	-100,00	200,00	0	0	0
NPV Project A	104,90				
NPV Project B	81,82				

Question: The internal rates of return (IRR) of project A and B are closest to

a. 43,70% and 50,00% respectively
b. 43,70% and 100,00% respectively
c. 31,61% and 50,00% respectively
d. 31,61% and 100,00% respectively

9.

Assume a perfect capital market. The remaining maturity of corporate Bond A is one year, its nominal value €1.000,00 and its coupon 4,00%. The yield-to-maturity of Bond A is 12,00% and its expected return 7,00%. The 1-year spot rate is 4,00%.

Question: Which of the following statements is **true**?

a. The price of Bond A is €1.000,00 and the default spread is 8,00%.
b. The price of Bond A is €928,57 and the default spread is 8,00%.
c. The price of Bond A is €1.000,00 and the default spread is 3,00%.
d. The price of Bond A is €928,57 and the default spread is 3,00%.

10.

Assume a perfect capital market. Bond A has no default risk and a remaining maturity of 1 year. The coupon of A is 5,00%. Bond B has no default risk, a remaining maturity of 10 years and a coupon of 10,00%. The price of bond A is €1.000,00. The term structure of interest rates is downward sloping. The nominal value of both bonds is €1.000,00.

Question: Which of the following statements is **true**?

a. The yield-to-maturity of Bond A is higher than the yield-to-maturity of Bond B.
b. The yield-to-maturity of Bond A is lower than the yield-to-maturity of Bond B.
c. The yield-to-maturity of Bond A is equal to the yield-to-maturity of Bond B.
d. The yield-to-maturity of Bond A can be either higher or lower than the yield-to-maturity of Bond B.

11.

Assume a perfect capital market. According to the ECB on September 23 2017 the 1-year spot rate (r_1) was equal to -0,78% and the 2-year spot rate (r_2) -0,72%. During the lectures on bonds we have discussed among others the 'expectations theory'.

Question: The 1-year forward rate for the second year ($_1f_2$) is closest to

a. -0,66%
b. -0,72%
c. -0,74%
d. -0,84%

12.

Assume a perfect capital market and a flat term structure of interest rates. The *modified duration* of Bond A is 4,00 and of Bond B it is 5,00. The yield-to-maturity of Bond A is 3,00%. Assume the bonds have no default risk.

Question: If the interest rate decreases from 3,00% to 2,00%, then the percentage price increase of bond B is the closest to

a. 4,00
b. 4,50
c. 4,85
d. 5,00

13.
Consider a world in which the assumptions of the portfolio theory hold except for short selling. Short selling is not allowed. In this world only two risk bearing securities are traded, security A and B.

Security A has an expected return of 10,00% and a standard deviation of the return of 20,00%. Security B has an expected return of 20,00% and a standard deviation of the return of 30,00%. The correlation coefficient between the returns of A and B is 0,50. MRP denotes the minimum-risk portfolio.

Question: The expected return of the MRP is closest to

a. 11%
b. 13%
c. 14%
d. 16%

14.
Consider a world in which the assumptions of the CAPM hold. The risk-free interest rate is 2,00% while the expected return of the market portfolio is 8,00%. The following is known about securities A and B:

	A	**B**
Beta	0,80	1,20
Expected price **at t=1**	€10,68	€5,46
Weight of market capitalization in the market portfolio **at t=0**	20,00%	5,00%

In this world a rational investor X is active. At t = 0 the optimal portfolio of this investor consists of a long position of € 1.000,00 in shares A.

Question: The number shares B that investor X at t = 0 holds in his portfolio is the closest

a. 15
b. 20
c. 25
d. 50

15.
Assume a semi strong efficient capital market.

Questions: Which of the following statements is **the least credible one**, considering this capital market?

a. It is not useful to study publicly available information in order to systematically earn abnormal returns.
b. Securities with a level of systematic risk higher than zero on average earn a higher returns than risk-free assets.
c. By going long in shares with a beta smaller than 1, negative abnormal returns are systematically realized.
d. Inside information is not correctly reflected in share prices.

16.
Assume a perfect capital market. BUILDER N.V. consists of two different divisions. BUILDER has identified a comparable firm to estimate the cost of capital of its division CONCRETE. BUILDER has estimated the beta of the equity and debt of comparable firm BOB N.V. The beta of the equity of BOB is equal to 1,5. The beta of the debt of BOB is 0,0. The comparable firm is 25% debt financed (market value debt / (market value debt plus market value equity) = 25%) and the amount of its level of excess cash is equal to 10% of the sum of its market value of equity and debt. The risk free rate is 1,00% and the market risk premium 6,00%. Ignore corporate tax. In order to determine the cost of capital the management of BOUWER applies the CAPM. BOUWER is 100% equity financed and does not have any excess cash.

Question: The cost of capital (R_A) of the division CONCRETE of BUILDER N.V. is closest to

a. 7,0%
b. 7,5%
c. 8,0%
d. 8,5%

See the next pages for **Part B: Open questions**.

Part B: Open questions (18 points)

17. *(6 points)*
For producer DENNICO NV the expected earnings per share at the end of year 1 are equal to €10,00 (EPS_1 = €10,00). Rather than reinvest these earnings and grow, the firm plans to pay out all of its earnings as dividends (the pay-out ratio is 100%). The expected growth of the dividends is therefore 0%. The current share price is €100,00 ($P_{t=0}$ = €100,00). DENNICO is fully financed with equity. The market risk premium is 6,00% and the risk free interest rate is 1,00%.

Questions:

a. Calculate the required return on equity (R_E) of DENNICO NV. (*1 point*)

b. Calculate the beta of the equity of DENNICO NV. *(1 point)*

At t = 0 DENNICO decides to decrease its pay-out ratio permanently from 100% to 60,00% starting at t = 1 and use the retained earnings to finance investments in new projects. The first investment in growth will take place at t = 1. Assume the 'return on investment' of the investments in growth is and will remain 15,00%.

c. Calculate the expected investment in new projects at t = 1 (assume a pay-out ratio of 60%). Assume that the number of outstanding shares is equal to 2 million. Denote your answer in Euros and show your calculations. *(1 point)*

At t = 0 the board of DENNICO announces the change in policy regarding the dividend and the investment program.

d. Calculate the expected growth in the earnings per share due to the policy change regarding the dividend and the investment program. Denote your answer in percentages with one decimal, and show your calculations. (*1 point*)

e. Calculate the price per share at t = 0 directly after the announcement of the new policy. Assume a semi strong efficient market and assume that the required return on equity will not change as a result of the adjustment of the policy (R_E will remain the same). Denote your answer in Euros and show your calculations. *(1 point)*

f. Suppose that the 'return on investment' of the expansion investments is not equal to 15,00% but equal to your answer of question a. In that case, indicate whether or not a value is created by the policy change. Motivate your answer. A calculation is not necessary for this. *(1 point)*

18. (6 points)

You are given the following facts of firm A and B as separate entity:

	A	**B**
P/E ratio	14	10
Earnings per share (EPS)	€4,00	€3,00
Number of outstanding shares	800.000	400.000
Earnings	€3.200.000	€1.200.000
Market value of equity	€44.800.000	€12.000.000
Price per share	€56	€30

Firm A prepares to acquire firm B. The offer is entirely in new A shares, with B shareholders receiving 7 new A shares for every 10 shares B they own. The synergy of the acquisition is equal to €4.000.000. Both companies are fully financed with equity.

Question:

Calculate the net present value of the acquisition for the shareholders of B (the company that will be taken over). Denote your answer in Euros and show your calculations.
(6 points)

19. (6 points)
Consider a world in which the assumptions of the portfolio theory hold where *short selling* is allowed. In this world only two securities are traded, security A and B. The following data is known:

	A	B
E(R)	10%	30%
σ(R)	15%	30%

The correlation coefficient between the returns of security A and B is -1,00.

Question: Draw the efficient frontier in the figure below, where the expected return is on the vertical axis and the corresponding standard deviation is shown on the horizontal axis. *(6 points)*