School of Business and Economics

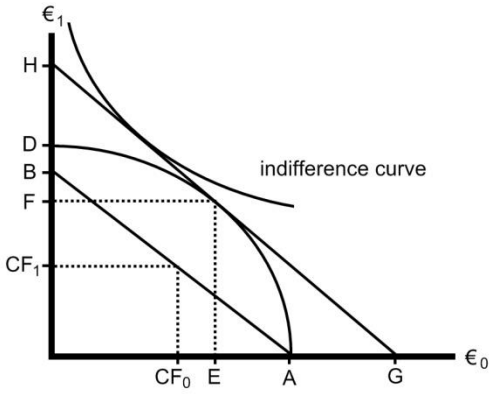
Exam:	Finance	Version A
Code:	E_IBA2_FIN	
Examinator:	Dr. M.B.J. Schauten	
Co-reader:	Prof. Dr. M.J. van den Assem	
Date:	18 December 2019	
Time:	15:15 – 17:15 hrs	
Duration:	2 hours	
Calculator allowed:	Yes	
Graphical calculator allowed:	No	
Number of questions:	19	
Type of questions:	16 multiple choice and 3 open	
Answer in:	English	
Remarks:	Answer the **multiple choice questions** by filling the corresponding box on the mc-answering form. For each question, only one answer is correct (a, b, c or d). If you give more than one answer, your response will be counted as wrong. The same is true if you provide no answer. The answers to the **open questions** should be written in the space below the open questions. There should be 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 15 January 2020.	
Inspection:	Will be announced via Canvas.	
Number of pages:	17 (including front page)	

Name : _____

Student number : _____

Part A: Multiple Choice questions (72 points)

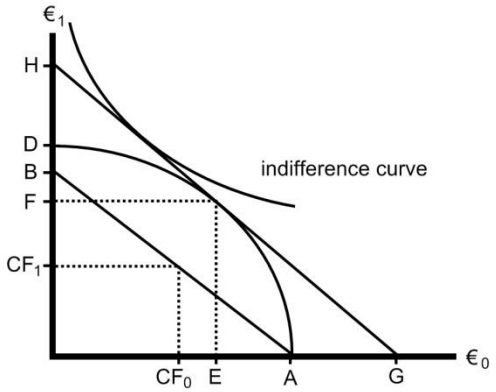
1.
Assume a world according to the Hirshleifer model. The income of Verbruggen at t = 0 and t = 1 (CF_0 and CF_1) is €61,20 and €71,40 respectively. The risk-free interest rate is 2,00%. At t = 1, Verbruggen pays €0,50 in interest. At t = 1 the proceeds of the real investment projects (OF) are €81,60. At t = 0 the consumption of Verbruggen (C_0) is €65,00. Consider the figure below (not drawn to scale).



Question: The net present value of the real investment projects is closest to

a. €21,20
b. €24,20
c. €58,80
d. €62,80

2.
Assume a world according to the Hirshleifer model. Jaap has a shop in Rotterdam with which he generates an income of €250,00 at t = 0 (CF_0) and €224,40 at t = 1 (CF_1).
Jaap wants to expand and invests €500,00 (EA) in a new store in Gouda at t = 0. The net present value of this real investment is €300,00 (AG). At t = 0 Jaap consumes €380,00 (C_0).
The risk-free interest rate is 2,00%. Consider the figure below (not drawn to scale).



Question: Jaap's consumption at t = 1 (C_1) is closest to

a. €340,10
b. €360,25
c. €388,60
d. €397,80

3.

Assume a perfect capital market. Entrepreneur X considers investing in one of the following projects. The projects are mutually exclusive and can be executed only once. The expected cash flows of each of the projects are shown in Table 1. Entrepreneur X has calculated the net present value (NPV) and the internal rates of return (IRR) of each of the projects. The results are shown in Table 2. Entrepreneur X is also interested in the Profitability Index (PI), but has not yet calculated these values. The PI is the present value of the expected cash flows from t = 1 onwards divided by the investment expenditure. When taking a decision, the goal is to maximize value creation.

Table 1: Expected cash flows of project A, B and C

Project / t	**0**	**1**	**2**	**3**
A	-100	60	60	90
B	-120	20	150	20
C	-150	60	30	190

Table 2: NPV and IRR of project A, B and C

Project	**NPV**	**IRR**
A	78,4	44,6%
B	49,2	26,2%
C	98,5	30,1%

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

a. The PI of project A is 1,4.
b. Entrepreneur X will invest in project A, because the PI of A is higher than that of B and C.
c. Entrepreneur X will invest in project A, because the IRR of A is higher than that of B and C.
d. Entrepreneur X will invest in project C despite the fact that PI of C is lower than the PI of A.

4.

Assume a world that meets the assumptions of the CAPM. Entrepreneur Spurgeon is considering investing in a shopping mall. The investment expenditure at t = 0 amounts to €300 million. The expected cash flow at t = 1 is €20 million and at t = 2 €26 million and then increases annually by 3,00%. The beta of the project (the asset beta) is 1,2. Assume a risk-free interest rate of 2,00% and a market risk premium of 5,00%.

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

a. €200 million
b. €205 million
c. €210 million
d. €215 million

5.

The expected cash flows of the Marcus project in euros before tax are shown in the table below. The applicable corporate tax rate is 25%. Ignore other taxes. The investment expenditure (at t = 0) for project Marcus project amounts to €90 and is depreciated to zero on a straight-line basis over three years. The discount rate is 10%.

Table: Expected cash flows in euros before tax

t	CF_t
0	–90
1	30
2	90
3	120

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

a. € 54
b. € 73
c. € 75
d. €101

6.

Company XLS Properties B.V. has the possibility to invest in two projects. The projects are mutually exclusive. Each project can be executed only once. The expected cash flows in euros for the two projects are shown in the table below. The cost of capital of both projects is 10,0%. Ignore taxes.

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

CF_t Project / t	0	1	2	3
A	-100,00	400,00	0	0
B	-100,00	0	0	400,00

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

a. The net present value of project A is €243 and that of B is €264.
b. The net present value of project A is €223 and that of project B is €254.
c. The internal rate of return of project A is 300,0% and that of B is 58,7%.
d. The internal rate of return of project A is 250,0% and that of B is 312,7%.

7.

Assume a perfect capital market. Bonds A, B and C are traded in this market and have no default risk. The nominal value of each of the bonds is €1.000,00. The table below shows the coupon and maturity of each of the bonds, and the price for A and B. The yield to maturity of bond C is 2,16% and the forward rate for year 3 ($_2f_3$) is 2,50%.

Bond	Coupon	Maturity	Price
A	2%	1	€ 1.000,00
B	2%	2	€ 1.000,00
C	4%	3	?

Question: The price of bond C is closest to

a. €1.043
b. €1.053
c. €1.065
d. €1.075

8.
Assume a perfect capital market. In this market, bonds issued by CokaKola are traded. The nominal value of the bonds is €1.000,00; the coupon is 7,00% and the remaining maturity is 1 year. The probability of default is 5%. In that case the bondholders will only receive €500,00 at t = 1 instead of € 1.070. The risk premium reflected in the price of the bond is 3,00%. The one-year spot rate is 2,00% (r_1).

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

a. The price of the CokaKola bond is €991,90 and the yield to maturity is 5,00%.
b. The price of the CokaKola bond is €991,90 and the yield to maturity is 7,87%.
c. The price of the CokaKola bond is €1.019,04 and the yield to maturity is 5,00%.
d. The price of the CokaKola bond is €1.019,04 and the yield to maturity is 7,87%.

9.
Assume a perfect capital market. For company A and company B the following is given:

	A	B
Earnings per share at t = 1 (EPS_1)	€20	€20
Annual growth rate	2,0%	4,0%
Price at t = 0	€200	€100

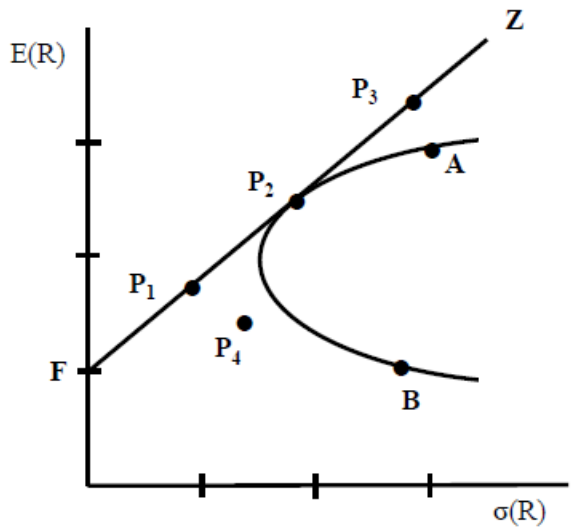
The discount rate applicable to both companies is 10,0%. Assume for both companies that the dividend pay-out ratio and the annual growth rate of the earnings do not change.

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

a. The dividend pay-out ratio of company A is 60%.
b. The dividend pay-out ratio of company A is 80%.
c. The dividend pay-out ratio of company B is 50%.
d. The dividend pay-out ratio of company B is 70%.

10.

Consider a world in which the assumptions of the portfolio theory hold. In this world, apart from the risk-free investment object F, only the two risk-bearing securities A and B are traded (see Figure below). Going short (and long) in F, A and B is permitted. The curve through A and B shows the expected return [E(R)] and the standard deviation of the return [σ(R)] for portfolios composed of combinations of A and B. The semiline FZ is tangent to this curve at point P_2.



12.

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

a. Portfolio P_1 can be composed by going long in F and long in both A and B.
b. Portfolio P_2 can be composed by going long in both A and B.
c. Portfolio P_3 can be composed by going short in F, long in A and short in B.
d. Portfolio P_4 can be composed by going long in F and long in both A and B.

11.
Consider a world in which the assumptions of the portfolio theory hold. Short selling is allowed. In this world, only shares A and B are traded. There is no risk-free investment opportunity. The correlation coefficient between the returns of A and B is 1. The expected returns and standard deviations of the returns are shown in the table below:

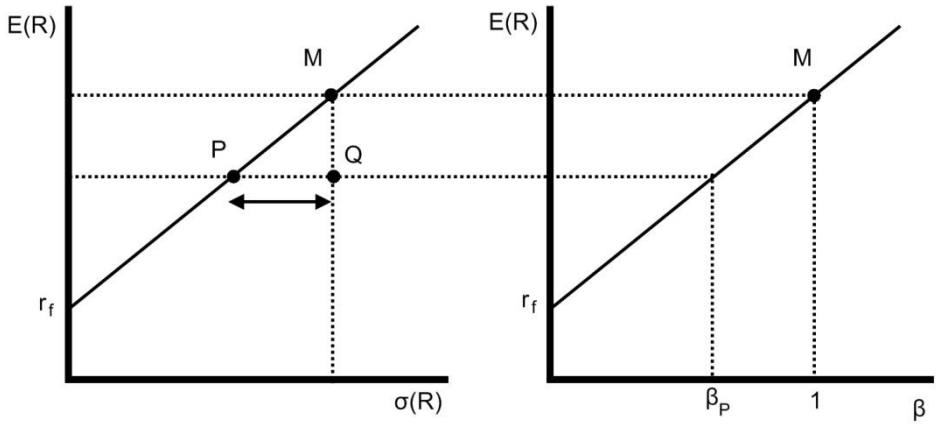
Share	E(R)	σ(R)
A	10%	20%
B	20%	50%

The expected return of portfolio X is 15%.

Question: The standard deviation of the return of portfolio X is closest to

a. 30%
b. 35%
c. 40%
d. 45%

12.
Assume a world in which the assumptions of the CAPM hold. Consider the figure below in which M represents the market portfolio and Q represents an individual investment object:



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

a. The systematic risk of Q is smaller than the total risk of M.
b. The unique risk of Q is greater than that of a portfolio consisting of a 50% long position in M and a 50% long position in F.

c. The beta of a portfolio consisting of a short position in F and a long position in M is greater than 1.
d. The beta of Q is equal to the beta of M.

13.
Assume a world in which the assumptions of the CAPM hold. The risk of the return of SMASH shares and that of the market portfolio (M), expressed in terms of its standard deviation, is equal to 35,00% and 24,00% respectively. The correlation coefficient between the returns of SMASH and M is 0,45. The risk-free interest rate is 2,00%.

Question: The unique risk of share SMASH is closest to

a. 16,75%
b. 17,25%
c. 18,75%
d. 19,25%

14.
Assume a world in which the assumptions of the CAPM hold. In this world, in addition to a risk-free investment security F with a return of 2,0%, only the two risk-bearing securities A and B are traded. The following is known about these securities:

	A	B
E(R)	6%	16%
σ(R)	30%	40%
market value of the equity (in € million)	80	20
Current price per share	€ 10	€ 15

The correlation coefficient between the returns of A and B is 0. Investor X who operates in this world has equity of €20.000. His optimal portfolio (portfolio OPT) has an expected return of 5,6%.

Question: The standard deviation of the returns of portfolio OPT is closest to

a. 14%
b. 15%
c. 16%
d. 17%

15.
The expected cash flow from Project X at t = 3 is €7.500. The required return of Project X is 8,00%. The risk-free interest rate is 2,00%.

Question: The Certainty Equivalent Cash Flow of the expected cash flow at t = 3 is closest to:

a. €6.318
b. €7.073
c. €7.083
d. €7.941

16.
Event studies show that, on average, premiums are paid for acquisitions in the range of 20%-30%. Investor AUREUS has developed a method with which he can select companies that have a relatively high chance of being acquired. In applying this method, AUREUS uses publicly available information only.

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

a. If investor AUREUS is able to systematically realise abnormal returns by using its developed method, then that is indicative of a market that is efficient in the weak form.
b. If investor AUREUS is able to systematically realise abnormal returns by using its developed method, then that is indicative of a market that is not efficient in the semi-strong form.
c. If investor AUREUS is unable to systematically realise abnormal returns by using its developed method, then that is indicative of a market that is not efficient in the weak form.
d. If investor AUREUS is unable to systematically realise abnormal returns by using its developed method, then that is indicative of a market that is not efficient in strong form.

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

Part B: Open questions (18 points)

17. (6 points)

The following is known about company AHOLDO (A) and company BELBAIZE (B) as independent entities:

	A	B
Market value of the equity (€ million)	240,0	160,0
Market value interest bearing debt (€ million)	100,0	0,0
Number of outstanding shares (million)	4,0	12,0
Cost of capital	8,0%	8,0%

The management of AHOLDO decides to announce a bid for all outstanding shares of BELBAIZE. Assume the shareholders of BELHAIZE will accept the offer, and consequently there are no doubts that the takeover will take place. For every 5 shares of BELHAIZE they own, shareholders of BELHAIZE will receive 1 new AHOLDO shares *and* €10,00 in cash (1 new share A plus €10,00 in cash for every 5 shares B). The cash is paid out of AHOLDO's excess amount of cash. The net present value of the expected synergies from the takeover is estimated at €20,0 million. As a result of the merger the market value of the interest bearing debt of AHOLDO will increase – at the day of announcement – from €100,0 million to €102,0 million. Company AHOLDO seeks to maximize shareholder value for A's current shareholders. Assume a capital market in the semi-strong form.

a. Calculate the total number of new shares that will be paid by AHOLDO to the shareholders of BELHAIZE. Show your calculations. (1 point)

b. Calculate the total amount of cash that will be paid by AHALDO to the shareholders of BELHAIZE. Show your calculations. (1 point)

c. Calculate the market value of A's equity immediately after the acquisition of B. Show your calculations. (2 points)

d. Calculate the return for AHOLDO's shareholders at the time the acquisition is announced. Round your answer to two decimal places (e.g. 1.23%). Show your calculations. (2 points)

18. (6 points)

Assume a perfect capital market. Default risk-free bonds A and B are traded in this market. The remaining maturity of bond A is 3 years, that of bond B is 6 years. The coupon of bond A is 6,0% and is paid annually. Bond B is a so-called 'zero coupon bond'. The nominal value of both bonds is €1.000. Assume a horizontal (flat) term structure of interest rates. The interest rate is 1,0%.

Question:

a. Calculate the price of bond A. Round off your answer to cents (for example €1,23). Show your calculations. (1 point)

b. Determine the duration of bond A. Denote your answer in two decimals. Show your calculations. (2 points)

c. Determine the *modified* duration of bond B. Denote your answer in two decimals. Show your calculations. (1 point)

Suppose that the *modified* duration of a pension fund's assets is 30,0 and that of its liabilities is 40. Assume that at t = 0 the fund's coverage ratio is 1,0 (= value of the pension fund's investment portfolio is equal to the present value of the pension fund's liabilities).

d. What is the effect of an increase of the interest rate from 1,0% to 2,0% on the coverage ratio of the pension fund? Calculate the coverage ratio immediately after the increase in the interest rate. Round off your answer to two decimal places and show your calculations. (2 points)

19. (6 points)

Assume a perfect capital market without corporate taxes.

BREALEY N.V. has three different divisions. One of the divisions is active in the field of chemistry. For this division, the management of BREALEY N.V. wants to determine the cost of capital on the basis of a comparable listed firm. The management of BREALEY N.V. has estimated the beta of the equity and debt for comparable company MYERS CHEMICALS N.V.

The beta of the equity of MYERS CHEMICALS N.V. is 1,8. The systematic risk of the debt of MYERS CHEMICALS N.V. is zero. MYERS CHEMICALS N.V. is financed by 30% equity and 70% debt. The risk-free interest rate is 2,00% and the market risk premium is 6,00%.

The management of BREALEY N.V. applies the CAPM to determine the cost of capital. BREALEY N.V. is financed by 60% equity and 40% debt. Neither BREALEY N.V. nor MYERS CHEMICALS N.V. has an excess amount of cash.

Questions:

a. Calculate the required return by the providers of equity of MYERS CHEMICALS N.V. Round off to 2 decimal places (e.g. 1.23%) and show your calculations. (1 point)

b. Calculate the required return by the providers of debt of MYERS CHEMICALS N.V. Round off to 2 decimal places (e.g. 1.23%) and show your calculations. (1 point)

c. Calculate the cost of capital of the division in chemicals of BREALEY N.V. Round off to two decimal places (e.g. 1.23%) and show your calculations. (2 points)

d. Suppose that MYERS CHEMICALS N.V. has an excess amount of cash at its disposal. Would the cost of capital of the division in chemicals of BREALEY N.V. in that case be equal to, higher than or lower than the outcome under c.? Motivate your answer. (2 points)