## Multiple-choice questions Each question has only one correct answer. You obtain 1 point for each question answered correctly. You will be penalized with -0.2 points for each question answered incorrectly. If you leave a question unanswered, there is no penalization. Be careful; once you answer a question, you can change your answer, but you can not leave it unanswered anymore. If the effective annual rate is X% and we consider semi-annual compounding, which of the following statements is correct: Assume 0<X<1 Α The effective semi-annual rate is lower than $\left(\frac{X}{2}\right)\%$ B The effective semi-annual rate is higher than $\left(\frac{X}{2}\right)\%$ The effective semi-annual rate equals $\left(\frac{X}{2}\right)\%$ С If X is low, the effective semi-annual rate is higher than $\left(\frac{X}{2}\right)\%$ ; meanwhile, if X is high, the semi-annual D rate is lower than $\left(\frac{X}{2}\right)\%$ Which of the following statements is correct Α If we face positive inflation, real rates exceed nominal rates If the annual proportional rate (APR) equals 10% and the bank offers quarterly compounding, the Β effective annual rate (EAR) is 10.38% If the effective annual rate (EAR) equals 4%, and the bank offers quarterly compounding, the annual С proportional rate (APR) is 4.06% Consider the EAR is 5%. The present value of a project with cashflow next year of 100€ and growth of D 1€ per year after that is 2500€



A portfolio with a positive weight in each stock has no risk.



Stocks whose returns are negatively correlated usually share the sign of their returns (either both are positive or both are negative).



Expected returns tend to be higher for stocks with lower risk.



By holding many different stocks, we can eliminate the diversifiable risk

Which of the following four bonds listed below has the highest duration. All bonds have a yield of 3% and a face value of 100€. Coupon bonds pay the coupon annually.

А	Zero-coupon bond with a five-year maturity.
В	Zero-coupon bond with a three-year maturity.
С	A coupon bond with a three-year maturity and a coupon rate of 2%.
D	A coupon bond with a six-year maturity and a coupon rate of 10%.
Select the	e INCORRECT statement
А	The capital market line is a straight line that represents the relationship between expected returns and volatility.
В	The security market line is a straight line that represents the relationship between expected return and the exposure to systematic risk (beta).
С	The tangency portfolio is an efficient portfolio that maximizes the ratio between expected return and volatility.
D	By combining different stocks with the same beta, we can obtain a portfolio with a lower beta than the beta of each stock.

Valuing bonds and stocks         For the following five questions, consider the following assumptions:         1. The payout ratio is constant.         2. The return on equity (ROE) is constant.         3. Firms last forever.         4. The required rate of return (r) is constant.         5. If the firm retains earnings, the return on those earnings equals the ROE.         6. The required rate of return is the discount rate         You need to answer each question with a number.         Round to second decimal digit (e.g., if the result is 6.553, write 6.55; but, if the result is 6.558, write 6.56)         Be aware of the units by reading whether a symbol (e.g., €, %, etc.) is to the right of the number box.         Firm A is expected to have an EPS of 100€ next year. Assuming the firm does not retain any earnings and the required rate of return is 14%, what is the current stock price?         Price =       C         Firm B is expected to have an EPS of 5€ next year. If the firm retains 30% of its earnings and the firm's ROE equals 10%, what is the growth rate of dividends?         The growth rate is $g = $ %         Firm B trades at 175€ per share. What is the required return of return (r) of Firm B? $r = $ %         Firm C was traded at €150 (ex-dividend) in December 2023 and at €125 (ex-dividend) in December 2024. The firm distributed a €5 dividend on December 28. What is the stock's return, and what were the capital gains?         The return on the firm stock was	
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<ul> <li>1. The payout ratio is constant.</li> <li>2. The return on equity (ROE) is constant.</li> <li>3. Firms last forever.</li> <li>4. The required rate of return (r) is constant.</li> <li>5. If the firm retains earnings, the return on those earnings equals the ROE.</li> <li>6. The required rate of return (s) the discount rate</li> <li>You need to answer each question with a number.</li> <li>Round to second decimal digit (e.g., if the result is 6.555, but, if the result is 6.556, write 6.56).</li> <li>Be aware of the units by reading whether a symbol (e.g., €, %, etc.) is to the right of the number box.</li> <li>Firm A is expected to have an EPS of 100€ next year. Assuming the firm does not retain any earnings and the required rate of raturn is 14%, what is the current stock price?</li> <li>Price =</li></ul>	For the following five questions, consider the following assumptions:
<ul> <li>2. The return on equity (ROE) is constant.</li> <li>3. Firms last forever.</li> <li>4. The required rate of return (r) is constant.</li> <li>5. If the firm retains earnings, the return on those earnings equals the ROE.</li> <li>6. The required rate of return is the discount rate</li> <li>You need to answer each question with a number.</li> <li>Round to second decimal digit (e.g., if the result is 6.553, write 6.55; but, if the result is 6.558, write 6.56)</li> <li>Be aware of the units by reading whether a symbol (e.g., €, %, etc.) is to the right of the number box.</li> </ul> Firm A is expected to have an EPS of 100€ next year. Assuming the firm does not retain any earnings and the required rate of return is 14%, what is the current stock price? Price =K Firm B is expected to have an EPS of 5€ next year. If the firm retains 30% of its earnings and the firm's ROE equals 10%, what is the growth rate of dividends? The growth rate is g =% Firm B trades at 175€ per share. What is the required return of return (r) of Firm B? Firm C was traded at €150 (ex-dividend) in December 2023 and at €125 (ex-dividend) in December 2024. The firm distributed a €5 dividend on December 28. What is the stock's return, and what were the capital gains? The return on the firm stock was%, and capital gains were%	1. The payout ratio is constant.
3. Firms last forever.         4. The required rate of return (r) is constant.         5. If the firm retains earnings, the return on those earnings equals the ROE.         6. The required rate of return is the discount rate         You need to answer each question with a number.         Round to second decimal digit (e.g., if the result is 6.55; but, if the result is 6.556, write 6.56)         Be aware of the units by reading whether a symbol (e.g., €, %, etc.) is to the right of the number box.         Firm A is expected to have an EPS of 100€ next year. Assuming the firm does not retain any earnings and the required rate of return is 14%, what is the current stock price?         Price =KE         Firm B is expected to have an EPS of 5€ next year. If the firm retains 30% of its earnings and the firm's ROE equals 10%, what is the growth rate of dividends?         The growth rate is $g =M         Firm B trades at 175€ per share. What is the required return of return (r) of Firm B?         r =M         Firm C was traded at €150 (ex-dividend) in December 2023 and at €125 (ex-dividend) in December 2024. The firm distributed a €5 dividend on December 28. What is the stock's return, and what were the capital gains?         The return on the firm stock wasM, and capital gains wereM   $	2. The return on equity (ROE) is constant.
<ul> <li>4. The required rate of return (i) is constant.</li> <li>5. If the firm retains earnings, the return on those earnings equals the ROE.</li> <li>6. The required rate of return is the discount rate</li> <li>You need to answer each question with a number.</li> <li>Round to second decimal digit (e.g., if the result is 6.553, write 6.55, but, if the result is 6.558, write 6.56).</li> <li>Be aware of the units by reading whether a symbol (e.g., €, %, etc.) is to the right of the number box.</li> <li>Firm A is expected to have an EPS of 100€ next year. Assuming the firm does not retain any earnings and the required rate of return is 14%, what is the current stock price?</li> <li>Price =€</li> <li>Firm B is expected to have an EPS of 5€ next year. If the firm retains 30% of its earnings and the firm's ROE equals 10%, what is the growth rate of dividends?</li> <li>The growth rate is g =%</li> <li>Firm B trades at 175€ per share. What is the required return of return (r) of Firm B?</li> <li>r =%</li> <li>Firm C was traded at €150 (ex-dividend) in December 2023 and at €125 (ex-dividend) in December 2024. The firm distributed a €5 dividend on December 28. What is the stock's return, and what were the capital gains?</li> <li>The return on the firm stock was%, and capital gains were%</li> </ul>	3. Firms last forever.
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Consider the following data for Firm D

	2023	2024
Net Income	38,050	39,000
Book Value	780,000	792,500

The required rate of return of Firm D is 8% and the number of shares is 10,000.

The stock price of Firm D at the end of December 2024 is P =	€
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## Risk and return

You must enter a number in each box.

Round to second decimal digit (e.g., if the result is 6.553, write 6.55; but, if the result is 6.558, write 6.56) Be aware of the units by reading whether a symbol (e.g.,  $\in$ , %, etc.) is to the right of the number box.

The following table summarizes the statistics of the annual stock returns of Firms E, F, and G.

	Firm E	Firm F	Firm G
Mean	1.10%	6.23%	10.68%
Standard deviation	40%	60%	80%
Covariance with E	0.16	-0.12	-0.03
Covariance with F	-0.12	0.36	0.19
Covariance with G	-0.03	0.19	0.64

Compute the mean of an equally weighted portfolio of the three stocks.

Mean: %

Compute the mean and standard deviation of a portfolio with a 30% weight in Firm E, a 70% weight in Firm F.

Mean: %

<b>%</b>

Compute the standard deviation of Firm H, and the correlation between the returns of Firm H and Firm I using the table below.

	Firm H	Firm I		
2019	2%	21%		
2020	-4%	26%		
2021	-27%	-41%		
2022	12%	25%		
2023	-10%	45%		
2024	-21%	26%		
The standard deviation of Firm H is%				

## Portfolio theory and CAPM

You must enter a number in each box.

Round to second decimal digit (e.g., if the result is 6.553, write 6.55; but, if the result is 6.558, write 6.56)

Be aware of the units by reading whether a symbol (e.g.,  $\in$ , %, etc.) is to the right of the number box.

The following table summarizes the statistics of the annual stock returns of Firms H and I

	Firm H	Firm I
Mean	3.9%	4.8%
Standard deviation	40%	60%
Market capitalization	50	100

The covariance between H and I is 0.3, and the risk-free rate is 2%. Assume these two firms are the complete market.

Assume average returns are expected returns. What is the market risk premium?

The market risk premium is  $r_m - r_f =$  %

Use the previous result to compute the weight in the market portfolio of an optimal portfolio with an expected return equal to 3%.

An optimal portfolio with a weight of % in the market portfolio has an

expected return of 3%.

Assume Firm I has a CAPM-beta equal to 1.3 (it does not). Use the CAPM to obtain the expected return of the firm I

The expected return of firm I is % under the assumption that its beta is

1.3.

Compute the beta for Firm I and Firm H. Do not assume that average returns equal expected returns

Firm H's beta is and Firm I's beta is

## Variance and Covariance properties

If a, b and c are constant, and x, y, and z are random variables:

 $Var(a) = 0; \ Cov(a, x) = 0; \ Cov(x, x) = Var(x); \ Cov(x, y) = Cov(y, x)$ 

 $Var(ax + by) = a^{2}V(x) + b^{2}V(y) + 2abCov(x, y)$ 

Cov(ax, by + cz) = abCov(x, y) + acCov(x, z)