Examiner: **Prof. Dr. Dr. Bodo Vogt**

Last name: ....   **First name:** ....

Student ID.: ....   **Faculty:**   ....

Problem	1	2	3	4	5	6	7	Sum	Grade
Points									

signature: ....

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Please note:

1) The following additives may be used: **non-programmable pocket calculator; English language dictionaries; 3 pages (A4) of handwritten notes.**

2) This examination consists of **2 parts (5 pages)**. A maximum of 100 points can be achieved. The number of points for each section is indicated for each problem.

3) Part I: Quantitative Questions. This section contains questions which require some computational work. Sometimes it might be necessary to provide an explanation of the results. No negative points are possible.

4) Part II: Multiple Choice Questions. For each question only one out of all given opportunities is correct. The section will be evaluated in the following way: If a question is not answered, it yields 0 (zero) points; if it is answered correctly, it yields 5 (five) points; if it is answered incorrectly, it yields –2.5 (minus two and a half) point. However, if the total number of points for the section is negative, the number will be normalized to 0 (zero).

5) RETURN the question sheets (these sheets) and the solutions of part I when the examination is finished. Non returned parts can not be evaluated.

PART I: QUANTITATIVE QUESTIONS (60 POINTS)

Problem 1 (18 points)

(a) Bootstrap the term structure from the following coupon bonds:

Bond	Maturity (in years)	Coupon rate p.a.	Face value	Price
CB1	1	10%	100	105.77
CB2	2	12%	100	113.13
CB3	3	8%	100	105.63

(b) By using your answer in (a) determine the prices of the zero coupon bonds with 1, 2, and 3 years to maturity.
(c) By using your answer in (a) determine the forward rates for maturities of one and two years.
(d) Now assume that the term structure is flat at the level of 5%. What would be the duration of a coupon bond with the face value of 100, maturing in 3 years, and paying annually a coupon of 10?
(e) By using your answer in (d) determine the new price of a bond if the term structure shifts upwards by 50bps. What would be the value of a bond at the duration date with and without the interest change.

Problem 2 (12 Points)

Consider a minimum variance portfolio which consists of only 2 securities, A and B. The shares of these securities within the portfolio are 32% and 68%, respectively, the covariance between the securities is 0.02, and the variance of the minimum variance portfolio is 0.0336. Determine the standard deviations of the securities.

Problem 3 (13 Points)

Let the risk premium on the market be 7%, and the rate of the market's return be 10%. Consider the following table to answer the questions from (a) to (d):

Stock	Beta	Current price	Estimated price in 1 year	Estimated dividend in 1 year
A	0.65	20.00	21.51	0.00
B	1.00	18.00	19.00	2.00
C	1.30	24.00	25.00	1.50

(a) Which estimated return do these stocks have?
(b) Which expected return must these stocks have according CAPM?
(c) Draw a SML showing your results from (a) and (b). Which stocks are under- or overpriced?
(d) Let the standard deviation of stock C be 25% and that of the market 17%. How much of the stock's risk can be diversified away.

Problem 4 (17 Points)

Consider the two (excess return) index-model regression results, i.e. security characteristic lines, for stocks A and B. The risk-free rate over the period was 6%, and the market's average return was 14%. Performance is measured using an index model regression on excess returns.

	Stock A	Stock B
Index model regression estimates (SCL)	$1\% + 1.2(r_M - r_f)$	$2\% + 0.8(r_M - r_f)$
Coefficient of determination, R^2	0.576	0.436
Residual standard deviation, $\sigma(e)$	10.3%	19.1%
Standard deviation of excess returns	21.6%	24.9%

(a) Calculate the estimates of the following ratios for each stock:
   i.   Alpha.
   ii. Appraisal ratio.
   iii. Sharpe measure.
   iv. Treynor measure.

(b) Which stock is the best choice under the following circumstances?
   i.   This is the only risky asset to be held by the investor.
   ii. This stock will be mixed with the rest of the investor's portfolio, currently composed solely of holdings in the market index fund.
   iii. This is one of many stocks that the investor is analyzing to form an actively managed stock portfolio.

PART II: MULTIPLE CHOICE QUESTIONS (40 POINTS)

Problem 5:

Consider the market equilibrium in the CAPM. Which of the following statements is correct?

a) (5 points)

If a risk free asset is available in the market

☐ all investors who buy stocks buy the same portfolio of stocks

☐ all investors invest the same quantity of money in the same portfolio of stocks

☐ the portfolios of stocks of the investors can be different

☐ all investors invest the same quantity of money

☐ none of the answers above is correct

b) (5 points)

If a risk free asset is not available in the market

☐ all investors invest the same quantity of money in the same portfolio of stocks

☐ the portfolios of stocks of the investors can be different

☐ all investors invest the same quantity of money

☐ none of the answers above is correct

c) (5 points)

If the interest rate of the risk free asset increases then the market portfolio

☐ will not change

☐ might change

☐ none of the answers above is correct

d) (5 points)

Consider a market in which the market portfolio and the tangential portfolio determined according to CAPM do not coincide. What might be a reason for this?

☐ some investors do not have μ-σ preferences

☐ the preferences of the investors differ

☐ the investors invest different quantities of money

☐ none of the answers above is correct

Problem 6:

Consider an investor who only invested in German stocks and selected his portfolio according to Markowitz and now changes his mind and buys in Germany and France (both markets with the same risk free asset). Which of the following statements is correct?

a) (5 points)

In any case the investor

☐ will **not** buy the same portfolio as before

☐ will buy the same portfolio as before

☐ none of the answers above is correct

b) (5 points)

Will he then in any case buy a portfolio with

☐ at least the same expected return and the same or less volatility

☐ less expected return and the same or less volatility

☐ at least the same expected return and higher volatility

☐ less expected return and higher volatility

☐ none of the answers above is correct

Problem 7:

Assume that an asset exists that pays a return of 50% if Bayern Munich will be the German soccer champion (Deutscher Fußballmeister) 2006 and it pays a return of −10% if Bayern Munich will not be the champion.

a) (5 points)

Might it be useful to consider such an asset for the portfolio of an investor who only owns German stocks?

☐ Yes, since Bayern will be the champion for sure

☐ No, since it is nonsense to mix sports and stocks

☐ Yes, since the other stocks and this asset are almost uncorrelated

☐ No, since the risk is too high

☐ none of the answers above is correct

b) (5 points)

Can such an asset change the weights of the stocks in the market portfolio (if all other requirements of the CAPM are satisfied)?

☐ Yes, since the efficient frontier might change

☐ No, since it is nonsense to mix sports and stocks

☐ Yes, since Bayern will be champion for sure

☐ No, since this asset is not a stock

☐ none of the answers above is correct