Portfolio Management: Test I
Time: Monday, 6 May 2013 (retake)

Maximum points: 10
Calculator allowed.

ALL calculations and/or explanations in ALL questions must be shown! Just the final answer, even if it is correct, might yield zero points. Be clear and produce easy-to-read answers.

Question 1.1 [3 points.]

Assume that you are in a CAPM-world. Calculate the missing items in the table. After you have finished, make a clear and easy-to-read summary table of your results.

Stock	Expected	Standard Deviation	Beta	Residual Variance
A	8 %	10 %	**(5)**	0
B	12 %	**(2)**	2	0.49
C	**(1)** 8,5	**(3)**	1	0
D	5 %	**(4)**	0	0.36

Question 1.2 [3 points.]

Consider the following variance-covariance matrix for five assets.

	Security *A*	Security *B*	Security *C*	Security *D*	Security *E*
Security *A*	**478** σ=21,86	220	322	420	80
Security *B*	220	**325** 18,03	230	490	150
Security *C*	322	230	**655** 25,6	*700*	−230
Security *D*	420	470	*700*	**856** 29,26	250
Security *E*	80	150	−230	250	**125** 11,18
Expected return	10.00 %	9.00 %	12.00 %	15.00 %	7.00 %

a) You are about to construct a portfolio which consists of only *two* of the above assets. You want to have a portfolio variance that is as low as possible. There are ten (10) different alternatives to construct a two-security portfolio of the above five individual securities. Which two securities should you choose to minimize the portfolio variance. Why! [0.5 points.]
b) Compute the expected return and volatility of the minimum variance portfolio constructed of the two assets that yield the lowest possible portfolio variance? [2 points]
c) Comment on your portfolio results with respect to the security characteristics given in the above table. [0.25 points.]
d) There is actually something fishy in the variance-covariance matrix above. What or where is the fish? [0.25 points.]

Question 1.3 [4 points.] Three unrelated questions.

a) [2 points.] Suppose you have a project that has a 70 per cent chance of doubling and a 30 per cent chance of halving your investment in a day. (This is a high-risk project indeed.)
   i. Compute the expected return and volatility of a one-period investment.
   ii. Compute the expected return per day, given that you can renew the project each day for a very long period of time (in principle infinitely).
b) If a security lies above the SML, it is overvalued. True or false?
c) The presence of risk means that **i)** investors may profit more than they expected, **ii)** more than one outcome is possible, **iii)** final wealth may be greater or lower than initial wealth. Which one(s) is/are correct? Explain shortly.

Portfolio Management: Test II
Time: Monday, 6 May 2013 (retake)

Maximum points: 10
Calculator allowed.

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Question 2.1 [4 points.]

Four unrelated questions.

a) Let the expected stock return be 12% with a 25% volatility. Meanwhile, the expected return on gold is 8% with a volatility of 30%. Gold is both with respect to expected return and risk inferior to stocks. Why would anyone be willing to invest in gold? Draw a graph.

b) The table below shows information about the expected return, standard deviation, and beta for two funds and the risk-free security. Statement: According to the Treynor measure, Fund *B* should be chosen. True or false?

	Expected return	Std. deviation	Beta
Fund *A*	14%	25%	1.6
Fund *B*	8%	15%	0.7
Risk-free	3%	0%	0

c) In the beginning of a ten-year investment horizon, the value of Brazilian stocks was 191.796, and the indirect foreign exchange quote between the euro and the Brazilian Real 1.8047. In the end of the observation period the numbers were 1 289.439 and 2.5066, respectively. Statement: The return in terms of the Euro was 384.04 %. True or false?

d) The famous Fama–French (1993) empirical three-factor model has the following factors: the market factor, a small-company factor, and a momentum factor. True or false?

Question 2.2 [4 points.]

The greatest stock picker of our time, Dr Nat Jallen, knows that the alpha of a stock is –1.25 %, beta 0.95, and residual *variance* 0.04. For the same time period, the expected market return is 10% with a standard deviation of 20%, and the risk-free rate of return 3%. Dr Jallen does not bother to do the boring calculations by himself, so he asks his assistant to do the calculations for him. However, his assistant is still somewhat dizzy after the Wappen, which means you have to give some help.

a) Given the above information, compute the expected return and volatility of a portfolio that consists of the market portfolio and the active asset.

b) There are two individuals, Ms. Lily Flower with a risk aversion coefficient equal to 5, and her brother, Mr. Thorn Flower, with a risk aversion coefficient equal to 3. What is your investment advice for these two investors?

c) Given your investment advice in the previous part, compute the expected return and volatility of the two portfolios.

Question 2.3 [2 points.]

Assume that the portfolios *A* and *B* are well-diversified and that $E(R_A) = 12\%$ and $E(R_B) = 8\%$. Further, the economy has only one factor, and $\beta_A = 1.2$ and $\beta_B = 0.8$. State the expected return on another portfolio with a beta of 0.6.

☺☺☺ *Dr Jan* says: Good luck! ☺☺☺
Please, do not cheat. The consequences of cheating are severe.

Some Formulas

You may need these – or then not.

$$U(E(R_p),\sigma_p^2) = E(R_p) - 0.5A\sigma_p^2$$

$$w^*_{\text{Risky}} = \frac{E(R_S) - R_f}{A\sigma_S^2}$$

$$w_S^* = \frac{\sigma_B^2 - \sigma_{BS}}{\sigma_S^2 + \sigma_B^2 - 2\sigma_{BS}} + \frac{E(R_S) - E(R_B)}{A\cdot(\sigma_S^2 + \sigma_B^2 - 2\sigma_{BS})}$$

$$w_S^* = \frac{(E(R_S) - R_f)\sigma_B^2 - (E(R_B) - R_f)\sigma_{B,S}}{(E(R_S) - R_f)\sigma_B^2 + (E(R_B) - R_f)\sigma_S^2 - [(E(R_S) - R_f) + (E(R_B) - R_f)]\sigma_{B,S}}$$

$$w_X^* = \frac{\alpha_X \sigma_M^2}{\alpha_X \sigma_M^2 (1 - \beta_X) + [E(R_M) - R_f]\sigma_{X\varepsilon}^2}$$

$$w_M^* = \beta_p^* = \frac{E(R_M) - R_f + a + b\alpha_M}{A(1 - \rho^2)\sigma_M^2}$$