

STOCKHOLM UNIVERSITY

Department of Economics

**Course name:** Portfolio Theory  
**Course code:** EC7211  
**Examiner:** Bo Larsson  
**Number of credits:** 7,5 credits  
**Date of exam:** Sunday 24<sup>th</sup> of April 2016  
**Examination time:** 3 hours (09.00–12.00)

Write your identification number on each paper and cover sheet (the number stated in the upper right hand corner on your exam cover).

Do not write answers to more than one question in the same cover sheet. Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked. No aids are allowed.

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The exam consists of 4 questions. One question is worth 25 points the three others are of 20 points each, together with the maximum of 15 points on the assignments this amounts to 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

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Results will be posted on [www.mitt.su.se](http://www.mitt.su.se) (My studies) on 15<sup>th</sup> of May the latest

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**Good luck!**

## 1 Some short questions (20 points)

- Consider an economy with borrowing constraints. Show graphically (and argue) that the zero correlation portfolio will have a return equal to or higher than the risk-free asset. (Remember no borrowing does not mean you cannot invest in risk-free asset)
- What does the Two Mutual Fund Theorem imply? (Sometimes also called two fund separation theorem).
- What does the “sharpe ratio” show? What is the definition in words?

## 2 Efficient frontier (25 points)

You observe the following data:

Asset	Expected return	Covariance matrix		
A	15	25	20	10
B	10	20	25	-15
C	5	10	-15	9

Draw the efficient frontier together with the assets.

## 3 Black CAPM (20 points)

Imagine a world without a risk free investment and where all assets are normally distributed.

- What is a good proxy for the risk free rate (and why)?
- How risky is the proxy relative other portfolios?

## 4 Portfolio advice (20 points)

While walking in the park one day, you meet this shaggy guy in a green shirt walking his dog. You start talking and you tell him you're an economist in training. He then asks you for some financial advice. He takes you back to his home, which is a green truck with flowers and the words "Mystery Machine" emblazoned on the back of it. He pulls out a file, and says "There are two investments I have been considering. One investment (X) is pretty safe and was offered to me by a friend Fred. The other is a bit riskier (Y) and was put together by my financial wizard friend, Velma. I'm trying to decide between them, or should I split my money?" You think you can help this guy out. Assets X and Y have the following statistics:

$$E[r_X] = 10\%, \quad \sigma_X = 4\%$$

$$E[r_Y] = 6\%, \quad \sigma_Y = 2\%$$

$$\rho_{X,Y} = -1$$

- This guy seems kind of nervous-you decide to suggest something with low risk. What would be the lowest risk you could fix?
- If you were to advise him to buy just one of the assets, which one would be best if you rank them?