Mathematics of Finance
Problem Set 5
Due November 2

I. Complete Exercises 5.16, 5.17, 5.18, 5.19 of Zawstaniak and Capiński.

II. Suppose there are three stocks with covariance matrix

$$C = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 3 \end{pmatrix}$$

and expected return vector

$$\begin{pmatrix} 1 & 2 & 4 \end{pmatrix}$$

(a) Compute the inverse of C. (You may use a calculator or a computer if you wish.)

(b) Compute the minimum variance portfolio.

(c) Sketch the efficient frontier (giving a picture like Figure 5.10 in Zastawniak and Capiński).

(d) Suppose that in addition there is a risk-free asset with return .1. Sketch the efficient frontier in this case (giving a picture like Figure 5.11 in Zastawniak and Capiński).

(e) Describe the market portfolio.

(f) Compute the β for each of the three stocks and plot the expected returns against β (giving a picture like Figure 5.13 in Zastawniak and Capiński).