

Assignment 3 - Math 772

25/01/2006

1. Assume that, during the years 2000 to 2005, the *discounted* stock prices for the 4 companies that you used in the first assignment follow the SDE

$$dS_t^i = (\mu^i - r)S_t^i + \sum_{j=1}^4 \sigma^{ij} dW_t^j, \quad i = 1, \dots, 4,$$

where $W = (W^1, W^2, W^3, W^4)$ is a four-dimensional Brownian motion under the historical measure P . Take $r = 0.05$ and use a standard statistical package to estimate the parameters μ^i and σ^{ij} .

2. For each of the utility functions discussed in class (i.e exponential, logarithmic and power-law) and using the parameters from the previous exercise, obtain an expression for the continuous time optimal investment portfolio with these 4 stocks and a riskless bank account starting with an initial wealth $x = US\$1,000,000$ in January, 2006, over a one-year period.

3. Perform a $N = 100,000$ Monte Carlo simulations for these stock prices from January to December, 2006, and compute the optimal portfolio on each sample path. Obtain a histogram for the optimal terminal wealth and verify its statistical properties.