University of California, Los Angeles
Department of Statistics

Statistics C183/C283 **Instructor: Nicolas Christou**

Homework 3

Exercise 1:
Access the data in R as follows:

```
a <- read.table("http://www.stat.ucla.edu/~nchristo/statc183c283_10stocks.txt",
header=TRUE)
```

These are closing monthly prices for 10 stocks (the first 5 are the same as in homework 2) from January 1986 to December 2003. The last column represents the *returns* on $S\&P500$ for the same period (31-Jan-1986 to 31-Dec-2003). After you convert all the prices into returns (but not the last column - these are already returns), use the single index model to:

a. Estimate β, α, and residual risk (σ_ϵ) for each stock.

b. Estimate the mean, and variance for each stock. Do the same for the returns of the market (find the mean and variance of $S\&P500$).

c. Use the Vasicek's technique to adjust the betas for the next period.

Exercise 2:
Single index model. Use the same data as in exercise 1 (10 stocks) with $R_f = 0.001$ to:

a. Find the cut-off point C^* when short sales are allowed and when short sales are not allowed.

b. Assume short sales are not allowed: Find the composition of the optimum portfolio.

c. Assume short sales are allowed: Find the composition of the optimum portfolio.

Note: You should submit the table and the R commands that shows all the steps.

Exercise 3:
Constant correlation model. Use the same data as in exercise 1 (10 stocks) with $R_f = 0.001$ to:

a. Find the cut-off point C^* when short sales are allowed and when short sales are not allowed.

b. Assume no short sales are allowed: Find the composition of the optimum portfolio.

c. Assume short sales are allowed: Find the composition of the optimum portfolio.

Note: You should submit the table and the R commands that shows all the steps.