University of California, Los Angeles
Department of Statistics

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

Project 5

Please answer the following questions:

a. Assume the single index model holds. Use only the stocks with positive betas in your data. Choose a value of R_f and find the optimal portfolio (point of tangency) using the optimization procedure as discussed in handout #17: `http://www.stat.ucla.edu/~nchristo/statistics_c183_c283/statc183c283_tangent.pdf` . Note: If you don't have any negative betas then the variance covariance matrix is exactly the same as the one you constructed in Project 4, a(3).

b. Use only the stocks with positive betas in your data. Rank the stocks based on the excess return to beta ratio and complete the entire table based on handout #34:
`http://www.stat.ucla.edu/~nchristo/statistics_c183_c283/statc183c283_index_steps.pdf` .

c. Find the composition of the point of tangency with and without short sales allowed. Place the two portfolios on the plot with the 30 stocks, $S\&P500$, and the efficient frontier that you constructed in the previous projects.

d. We want now to draw the efficient frontier when short sale are not allowed. One way to this is to use a `for` loop where you vary R_f. For each R_f you find the composition of the optimal portfolio (tangency point) and its expected return and standard deviation. Finally connect the points to draw the efficient frontier.

e. Assume the constant correlation model holds. Rank the stocks based on the excess return to standard deviation ratio and complete the entire table based on handout #38:
`http://www.stat.ucla.edu/~nchristo/statistics_c183_c283/statc183c283_rho_steps.pdf` . Note: Please use the same R_f as the one in (a) if possible.

f. Find the composition of the point of tangency with and without short sales allowed. Place the two portfolios on the plot with the 30 stocks, $S\&P500$, and the efficient frontier that you constructed in the previous projects.