**Portfolio Optimization Assessment Instructions**

1. Choose 8 stocks from S&P 500 firms, Make sure they are in different industries
2. Download prices for last 5 years (monthly) from Bloomberg. After finding your stock, choose line chart from Related Functions Menu, then choose monthly data and 5 years, then choose table. Edit> Copy data to Clipboard >Paste in excel
3. Calculate monthly returns for each stock
4. calculate average return for each stock. Calculate excess return= Average return-risk free rate
5. calculate covariance matrix

* Data>data analysis>covariance
* input range=all monthly returns for the stocks (grouped by columns),
* output range=where do you want the matrix

1. Finding Minimum Variance Portfolio

* Open solver, choose objective as portfolio Standard Deviation, choose min, choose weights array for "by changing variable cells", for constraints, weight sum cell =1, also make unconstrained cells non negative unclick it, we allow short selling, then solve. What you get is your minimum variance portfolio weights, return, standard deviation etc.

1. Finding Maximum Sharp Ratio (tangent) Portfolio

* Open solver, choose objective as portfolio sharp ratio, choose max, choose weights array for "by changing variable cells", for constraints, weight sum cell =1, also make unconstrained cells non negative unclick it, we allow short selling, then solve. What you get is your tangent portfolio weights, return, standard deviation etc.

1. Creating Efficient Portfolio Points

* Open solver, choose objective as portfolio standard deviation, choose min, choose weights array for "by changing variable cells", for constraints, weight sum cell =1 and risk premium=another value. Also make unconstrained cells non negative unclick it, we allow short selling, then solve. What you get is your efficient portfolio weights, return, standard deviation etc. Repeat this 8 times by changing risk premium constraint.

1. Create your efficient portfolio graph using risk-return points(10) created.
2. Print and bring the page which includes the covariance matrix, all 10 portfolio weights, sd, risk premiums and efficient frontier graph.

**How to add Solver and Data Analysis Toolpaks to your excel**

Excel>File>Options>Add-ins>Manage Excel Add-inns>Go>Click Analysis Toolpak and Solver