Ayush Sharma
(150123046)

12 February 2018

QUESTION 1.

W = [[0.1],[0.2],[0.15]]

C = [[0.005, -0.01 , 0.004],[-0.01 , 0.04 , -0.002],[0.004, -0.002, 0.023]]

Table of the weights, return and risk of the portfolios for 10 different values on the efficient frontier.

S.No.	μ_v	σ_v	W_v
1	[[0.001]	[[0.25669901]	[[2.53614679 -0.44385321 -1.09229358]
2	[0.021]	[0.21496814]	[2.24990826 -0.33009174 -0.91981651]
3	[0.041]	[0.17351349]	[1.96366972 -0.21633028 -0.74733945]
4	[0.061]	[0.13259442]	[1.67743119 -0.10256881 -0.57486239]
5	[0.081]	[0.09292118]	[1.39119266 0.01119266 -0.40238532]
6	[0.101]	[0.05715002]	[1.10495413 0.12495413 -0.22990826]
7	[0.121]	[0.03842682]	[0.8187156 0.2387156 -0.05743119]
8	[0.141]	[0.05714745]	[0.53247706 0.35247706 0.11504587]
9	[0.161]	[0.09291802]	[0.24623853 0.46623853 0.28752294]
10	[0.181]]	[0.1325911]]	[-0.04 0.58 0.46]]

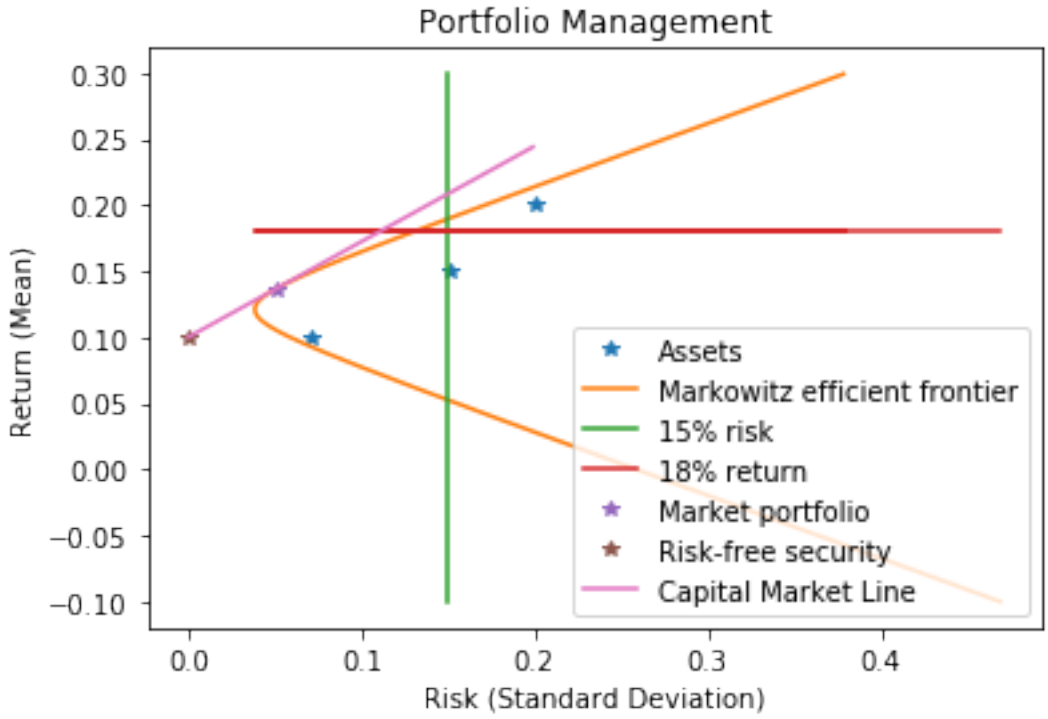
For a 15% risk, 0.18955479960806604 and 0.052446841081023425 are the maximum and minimum return and [-0.16243566, 0.62866033, 0.53377534] and [1.79984338, -0.1512198 , -0.64862357] the corresponding portfolios.

For a 18% return, [-0.02568807, 0.57431193, 0.45137615] is the minimum risk portfolio.

Assuming the risk free return r_f = 10% , [0.59375 , 0.328125, 0.078125] is the market portfolio.

Two portfolios (consisting of both risky and risk free assets) with the risk at 10% and 25% are [-0.968066577128289, [1.16853953, 0.64577185, 0.1537552]] and [-3.9201664428207224, [2.92134883, 1.61442961, 0.384388]] respectively.

Plot for the given data:


Portfolio Management
Return (Mean)
Risk (Standard Deviation)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
0.0
0.1
0.2
0.3
0.4
Assets
Markowitz efficient frontier
15% risk
18% return
Market portfolio
Risk-free security
Capital Market Line

QUESTION 2.

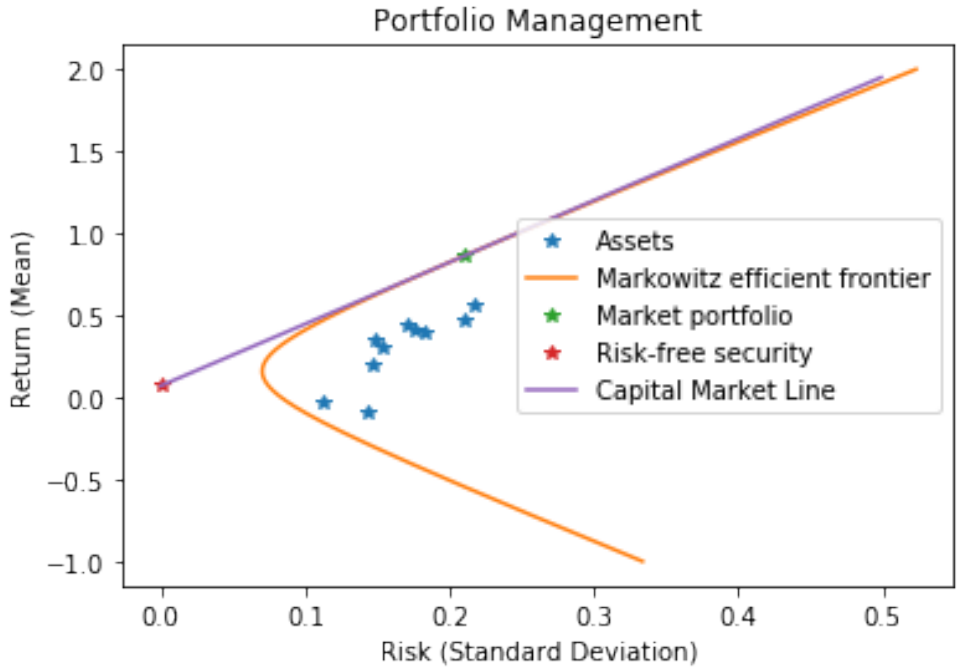
Stocks considered 'GOOGL', 'FB', 'AAPL', 'MSFT', 'AMZN', 'ADBE', 'TYO', 'XOM', 'BP', 'WMT'.

Daily data points from '2016/12/31' to '2017/12/31' i.e. 252 entries for a year.

Assuming the risk free return $r_f = 7\%$, [-0.31854609, 0.38650368, 0.25421108, 0.17421323, 0.13069756, 0.32279627, -0.39093938, -0.64093129, 0.52652152, 0.55547343] is the market portfolio.

Plots for the given data:

1.



2.