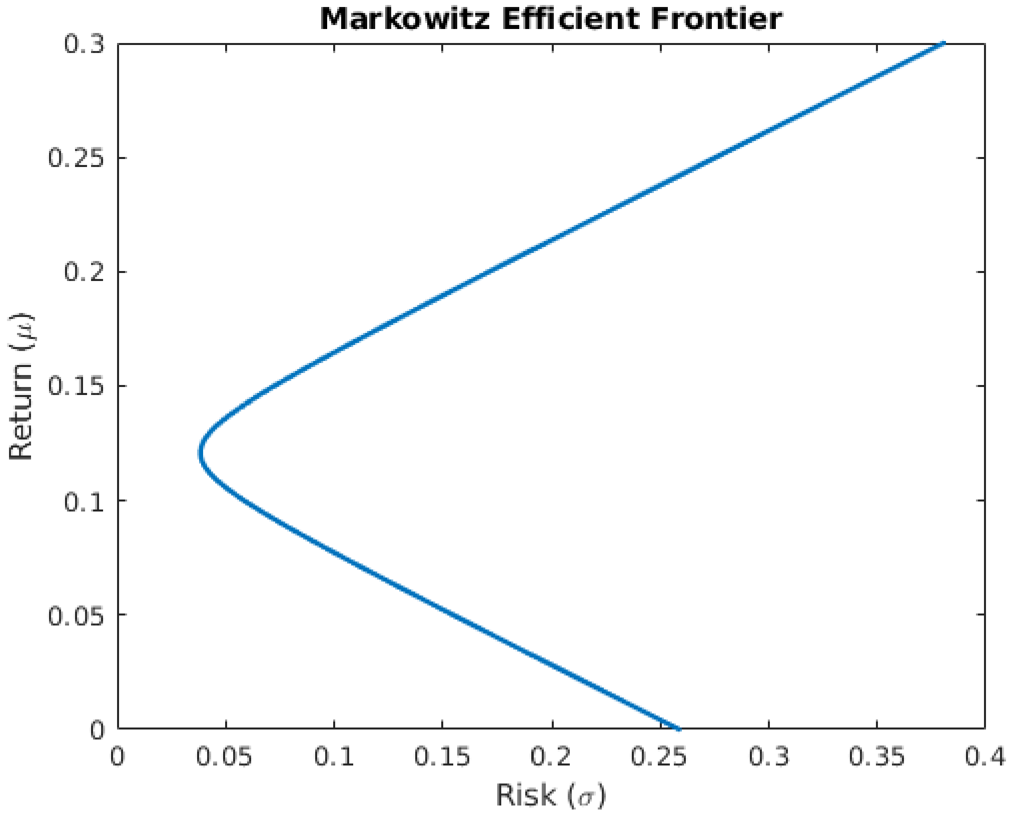
Financial Engineering Lab 4

Question 1

a)



b)

Index	w1	w2	w3	Return	Risk
50	2.478899	-0.421101	-1.057798	0.005000	0.248337
100	2.407339	-0.392661	-1.014679	0.010000	0.237895
150	2.335780	-0.364220	-0.971560	0.015000	0.227465
200	2.264220	-0.335780	-0.928440	0.020000	0.217049
250	2.192661	-0.307339	-0.885321	0.025000	0.206650
300	2.121101	-0.278899	-0.842202	0.030000	0.196269
350	2.049541	-0.250459	-0.799083	0.035000	0.185910
400	1.977982	-0.222018	-0.755963	0.040000	0.175577
450	1.906422	-0.193578	-0.712844	0.045000	0.165274
500	1.834862	-0.165138	-0.669725	0.050000	0.155008

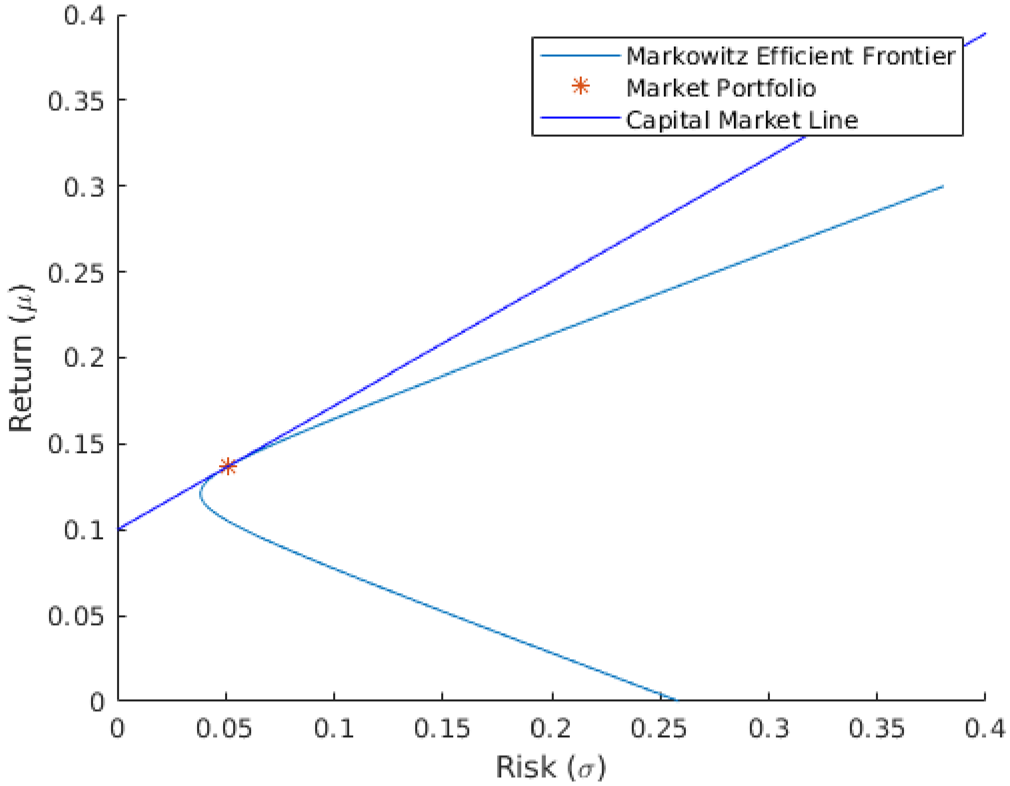
Part c) and d)

```
Portfolio for 18% return with Minimum Risk:
Weights: w1 = -0.025688 w2 = 0.574312 w3 = 0.451376
Risk = 0.130568

Portfolio for 15% risk with Minimum Return:
Return = 0.052400
Weights: w1 = 1.800514 w2 = -0.151486 w3 = -0.649028
```

e)

```
Portfolio for 15% risk with Maximum Return:
Return = 0.189600
Weights: w1 = -0.163083 w2 = 0.628917 w3 = 0.534165
```

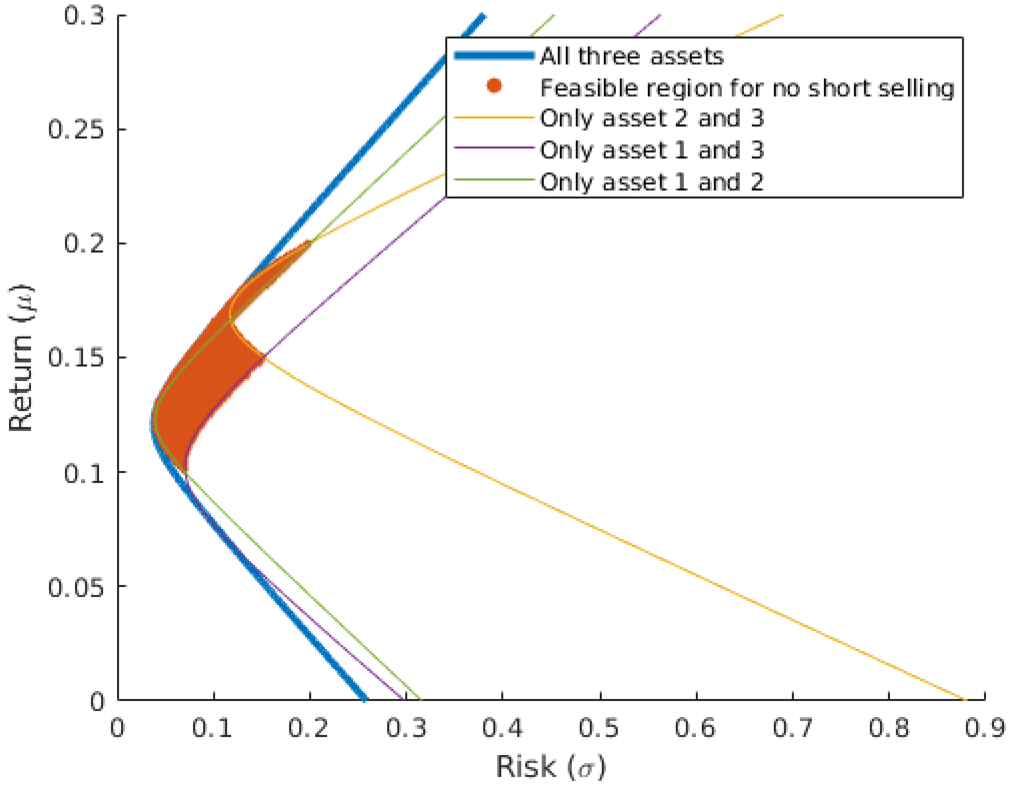


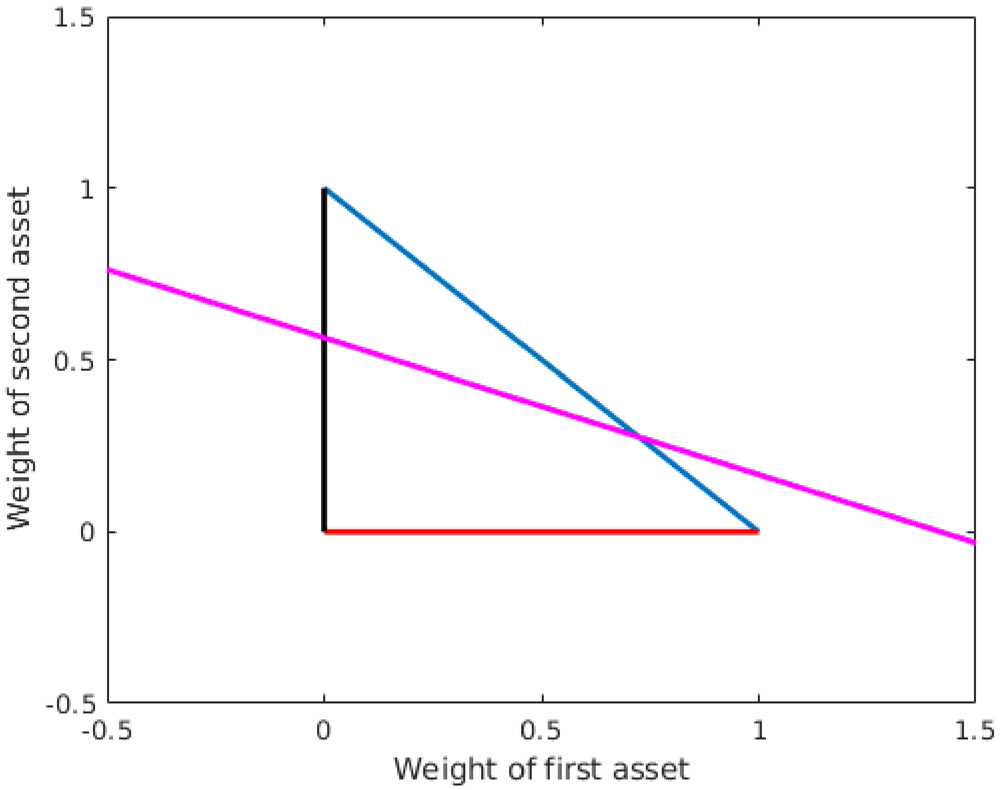
f)

```
Portfolio for 10% risk
Return = 0.172265
Weight of Risk-Free Asset = -0.968067
Weight of Risky Assets w1 = 1.168540 w2 = 0.645772 w3 = 0.153755

Portfolio for 25% risk
Return = 0.280662
Weight of Risk-Free Asset = -3.920166
Weight of Risky Assets w1 = 2.921349 w2 = 1.614430 w3 = 0.384388
```

Question 2





Equations for the weights are (w1,w2,w3)

$$\left(2.55 - 14.31\,\mu \quad 5.688\,\mu - 0.4495 \quad 8.624\,\mu - 1.101\right)$$

Question 3

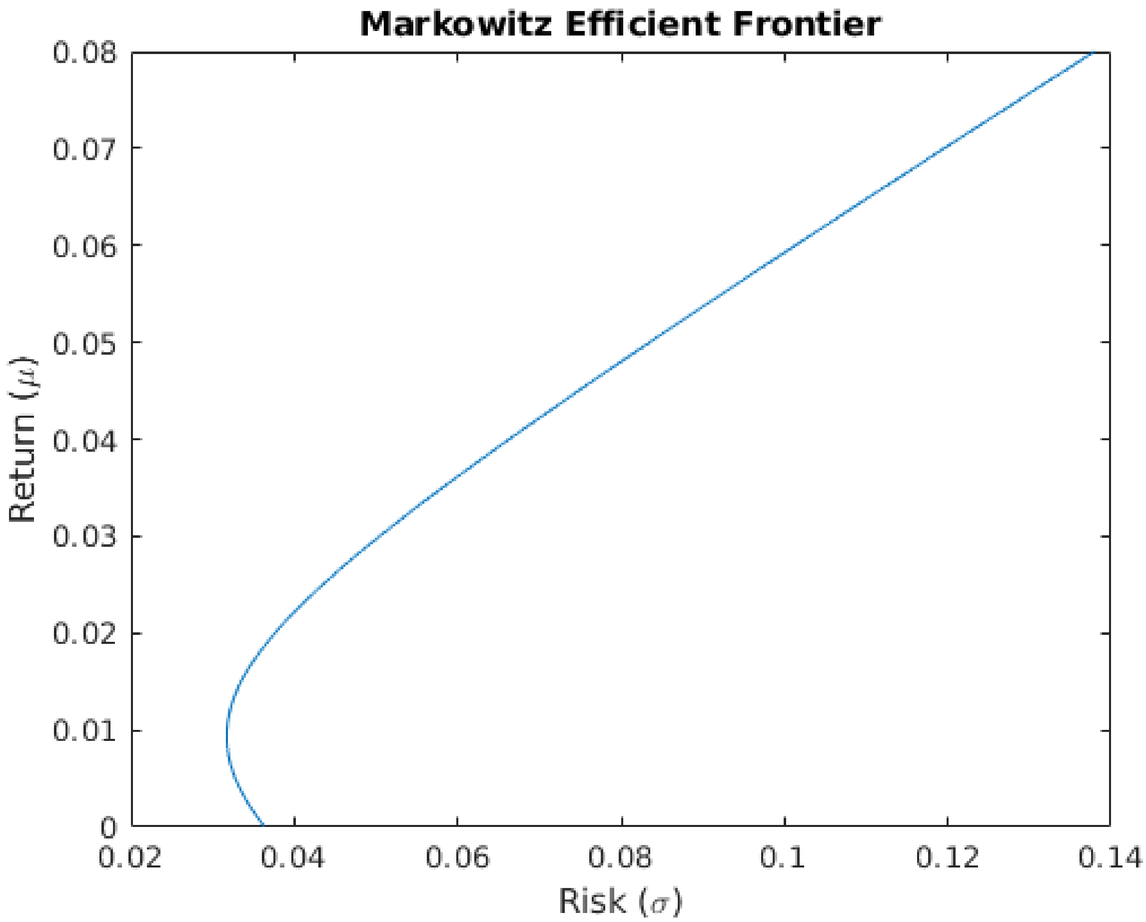
Monthly Stock data Taken from 1-03-2015 to 1-02-2020 (60 Data Points) for 10. Data can be found in Final_Data.csv.
Stocks Taken – AAPL (Apple Inc), AMZN(Amazon), FB(Facebook), GOOG(Google),JBLU(Jet Blue Airways), NFLX(Netflix), AAL(American Air Lines), S(Sprint), SFTBY(SoftBank), TSLA(Tesla)

All the Stock prices are in USD.

First 8 Records -

	Date	AAPL	AMZN	FB	GOOG	JBLU	NFLX	AAL	S	SFTBY	TSLA
1	2015-03-01	130.2800	388.4200	86.0700	576.3277	19.6000	68.6071	56.0500	5.4500	15.4200	206.1900
2	2015-04-01	134.5400	452.6500	85.5900	569.5762	21.2800	82.3043	53.4700	5.3900	16.4800	238.7500
3	2015-05-01	132.9700	439.0000	81.8500	544.1900	22.4000	90.2057	50.3000	5.2900	15.7850	252.8700
4	2015-06-01	131.3900	447.0400	89.4000	543.7400	21.6000	100.8914	44.3800	4.8100	15.2500	271.4100
5	2015-07-01	132.9700	580.5700	99.2400	678.6400	24.1900	117.8800	43.8100	4.6000	14.8050	286.6500
6	2015-08-01	122.5700	542.7400	98.7400	674.9000	24.6400	129.2900	44.4500	5.2900	15.7250	271.0000
7	2015-09-01	116.8900	549.7800	96.4900	650.9000	27.3600	111.2400	44.5900	5.2200	14.1400	271.5700
8	2015-10-01	121.2200	630.7200	105.1200	730.0000	27.0900	115.8300	46.7700	5.1200	14.2950	249.8400

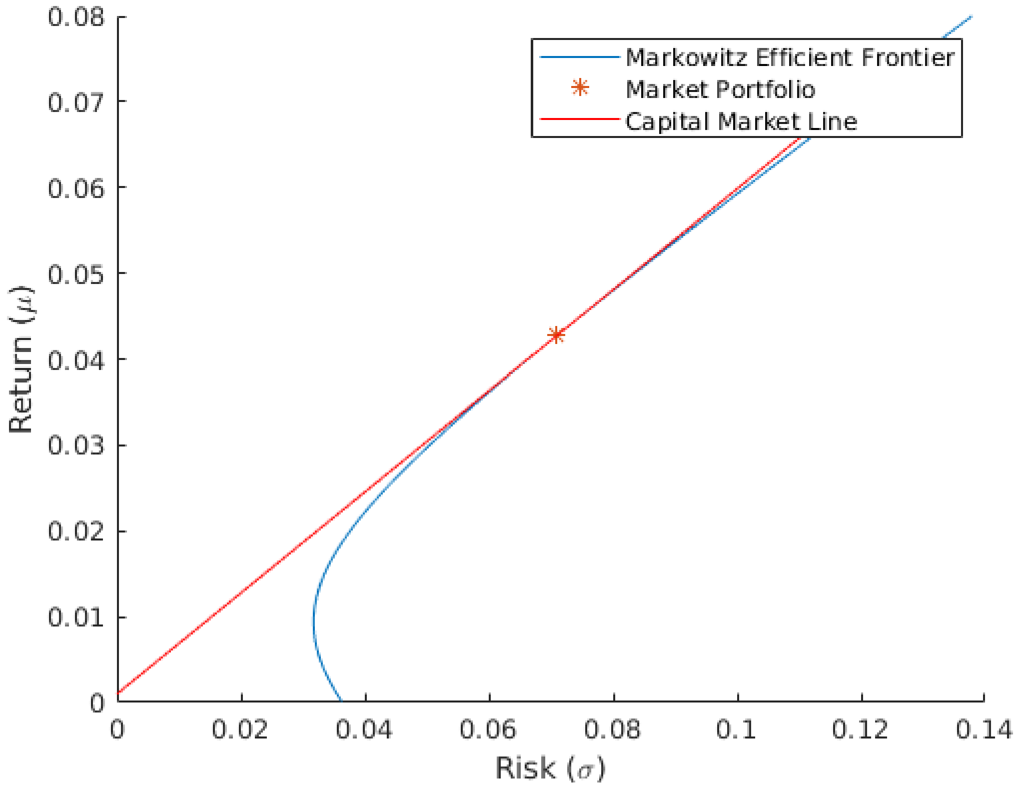
a)



b)

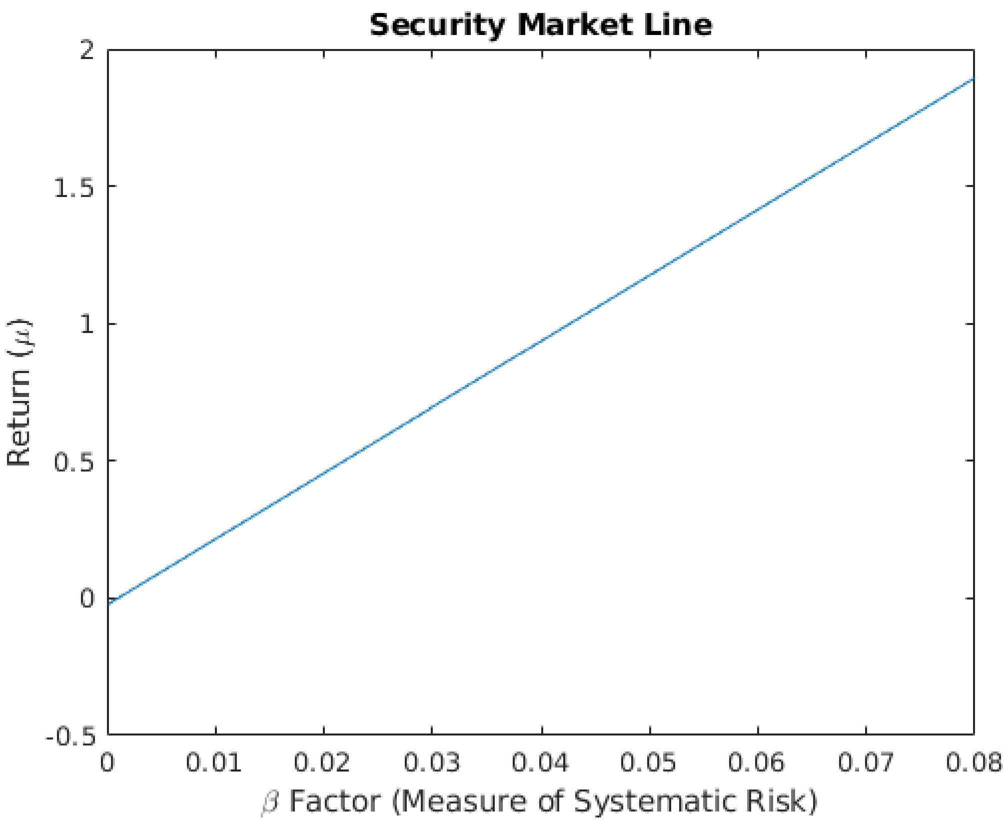
```
Market Portfolio:
Return = 0.042685
Risk = 0.070823
Weight of Assets w1 = 0.288343 w2 = 0.444927 w3 = 0.202027 w4 =
0.162054 w5 = 0.176630 w6 = 0.126781 w7 = -0.759517 w8 = 0.278773
w9 = -0.080182 w10 = 0.160165
```

c)



0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Return (μ)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
Risk (σ)
Markowitz Efficient Frontier
Market Portfolio
Capital Market Line

d)



Security Market Line
2
1.5
1
0.5
0
-0.5
Return (μ)
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
β Factor (Measure of Systematic Risk)