MA374 Financial Engineering lab: 04

Name: **Naman Goyal**
Roll No. **180123029**

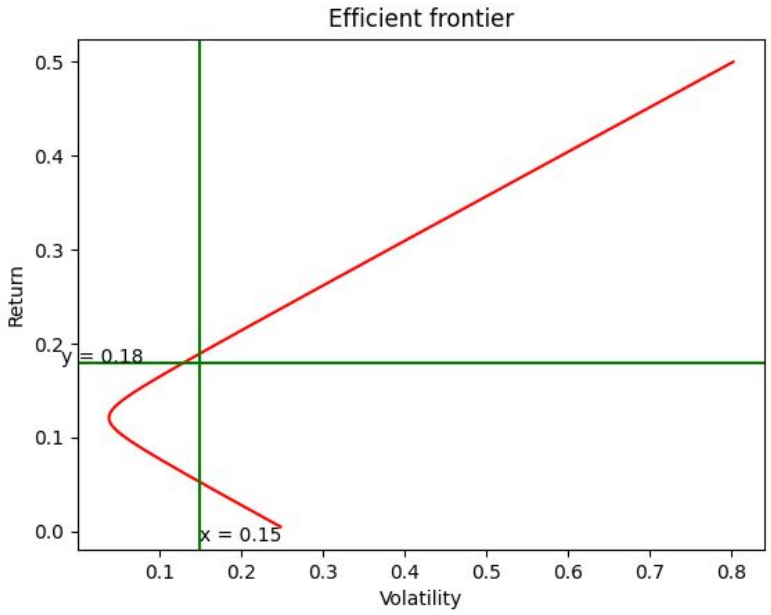
Ques.1

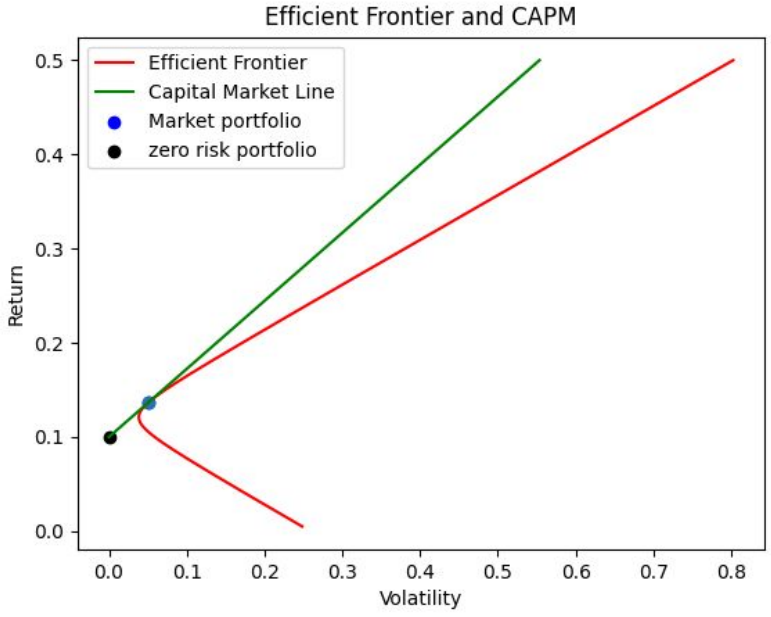
- To execute my .py file
  Run **$python3 180123029_NamanGoyal_q1.py** on the terminal. The snapshot is given below

```
~/Desktop/FE Labs/Lab04 > python3 180123029_NamanGoyal_q1.py                    ✔
Solution (a): See Graph
-----------------------------------------------------------------

Solution (b)
Value of portfolio for 10 different values of efficient frontier
Return:  0.005  Risk:  0.248337  W1:  2.478899  W2:  -0.421101  W3:  -1.057798
Return:  0.046257  Risk:  0.16269  W1:  1.888434  W2:  -0.186429  W3:  -0.702005
Return:  0.087514  Risk:  0.080579  W1:  1.297968  W2:  0.048243  W3:  -0.346212
Return:  0.128771  Risk:  0.041793  W1:  0.707503  W2:  0.282916  W3:  0.009582
Return:  0.170028  Risk:  0.110585  W1:  0.117038  W2:  0.517588  W3:  0.365375
Return:  0.211284  Risk:  0.194781  W1:  -0.473428  W2:  0.75226  W3:  0.721168
Return:  0.252541  Risk:  0.280855  W1:  -1.063893  W2:  0.986932  W3:  1.076961
Return:  0.293798  Risk:  0.367488  W1:  -1.654359  W2:  1.221604  W3:  1.432755
Return:  0.335055  Risk:  0.454361  W1:  -2.244824  W2:  1.456276  W3:  1.788548
Return:  0.376312  Risk:  0.541359  W1:  -2.835289  W2:  1.690948  W3:  2.144341
-----------------------------------------------------------------

Solution (c)
At 15 percent Risk, Max and Min Portfolios:
Return:  0.052445  Risk:  0.150003  W1:  1.799864  W2:  -0.151228  W3:  -0.648636
Return:  0.189583  Risk:  0.150058  W1:  -0.162843  W2:  0.628822  W3:  0.534021
-----------------------------------------------------------------
```

```
-----------------------------------------------------------------

Solution (d)
Portfolio (Without Riskfree Assets) at 18 percent
Return:  0.18  Risk:  0.130568  W1:  -0.025688  W2:  0.574312  W3:  0.451376
-----------------------------------------------------------------

Solution (e)
Risk Free Return 10% Market Portfolio
Return:  0.050811  Risk:  0.136719  W1:  0.59375  W2:  0.328125  W3:  0.078125
-----------------------------------------------------------------

Solution (f)
Portfolio(with risky and riskfree assets) at 0.1 percent risk :
Risk Free asset Weightage: -0.968067
Risky asset Weightge: 1.16854 0.645772 0.153755
Portfolio (Including Risky and Riskfree Assets) at 0.25 percent risk :
Risk Free asset Weightage: -3.920166
Risky asset Weightage: 2.921349 0.384388 0.384388
-----------------------------------------------------------------
```

- The plots for Markowitz Efficient Frontier && Frontier v/s CAPM is shown:





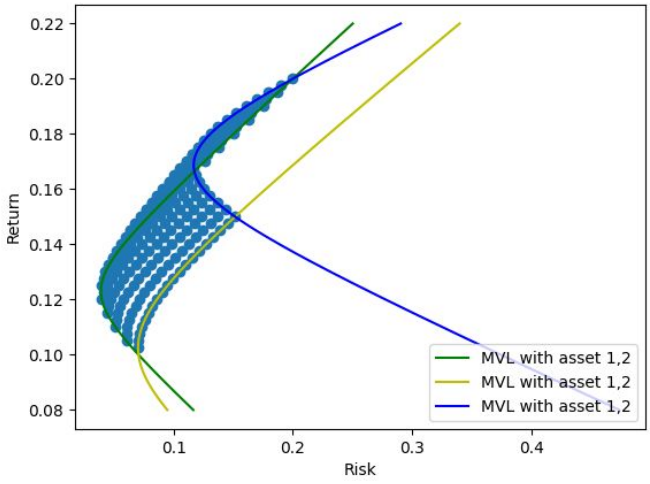
- My answers to this question are given in the snapshot of my terminal on the previous page.

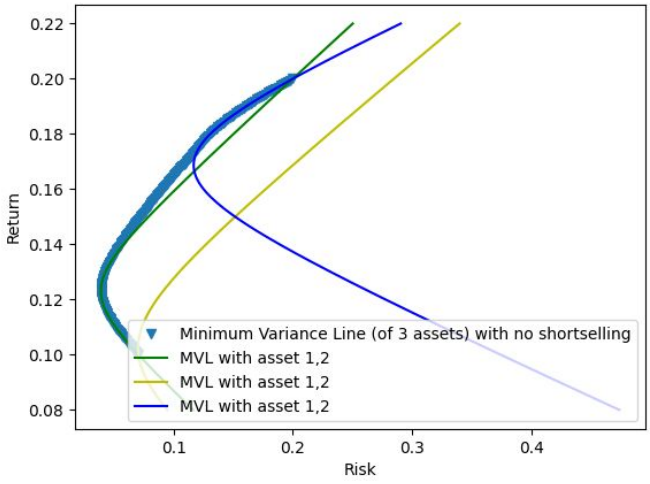
Ques.2

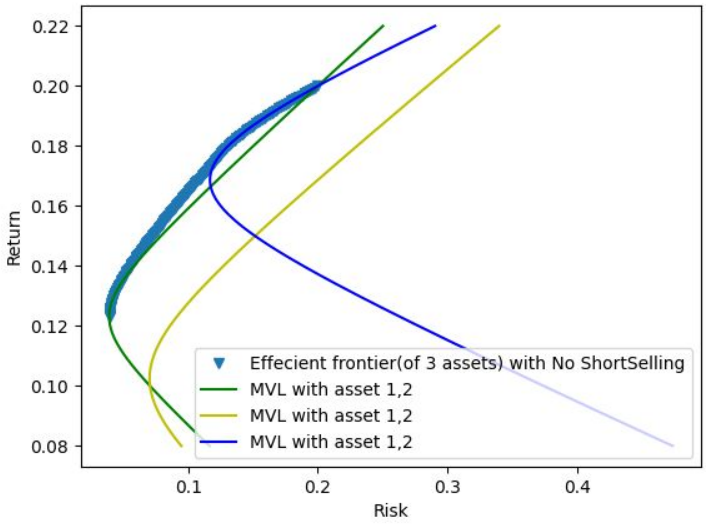
- To execute my .py file
  Run **$python3 180123029_NamanGoyal_q2.py** on the terminal. The snapshot is given below

```
~/Desktop/FE_Labs/Lab04  python3 180123029_NamanGoyal_q2.py                ✔  369  23:16:23
Plot for Feasible Region for No ShortSelling + Min Variance Line with 2 assets at a time
-----------------------------------------------------------------

Plot for Minimum Variance line with No ShortSelling + Minimum Variance Line with 2 assets at a time
-----------------------------------------------------------------

Plot for Efficient Frontier with No ShortSelling + Minimum Variance Line with 2 assets at a time
-----------------------------------------------------------------

Plot for Relationship amongst the W1 and W2 for No ShortSelling Case
-----------------------------------------------------------------

~/Desktop/FE_Labs/Lab04                                                    ✔  370  23:17:00
```

- The plots obtained are shown below for the Minimum Variance Line:

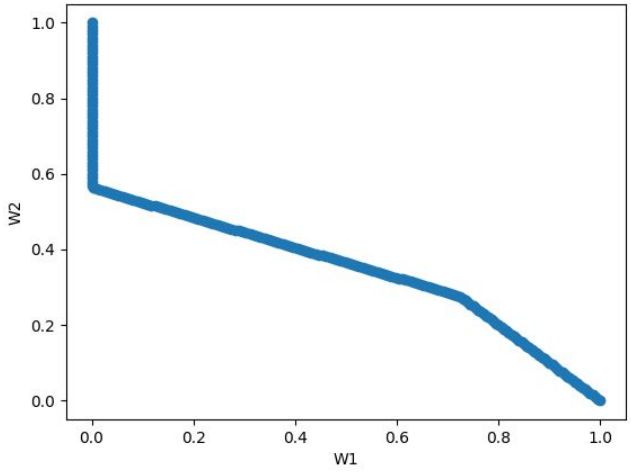






- The equations for the relationships between different weights are shown below:
  - W1 = -0.40*W2 + 0.56
  - W3 = -0.60*W1 + 0.44
  - W3 = 1.52*W2 - 0.42

- The plot showing the variation between assets weights for the Minimum Variance Line :

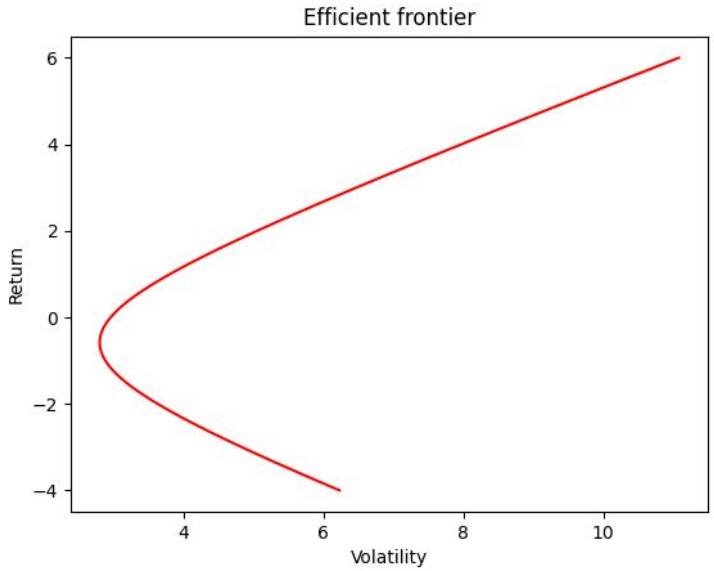


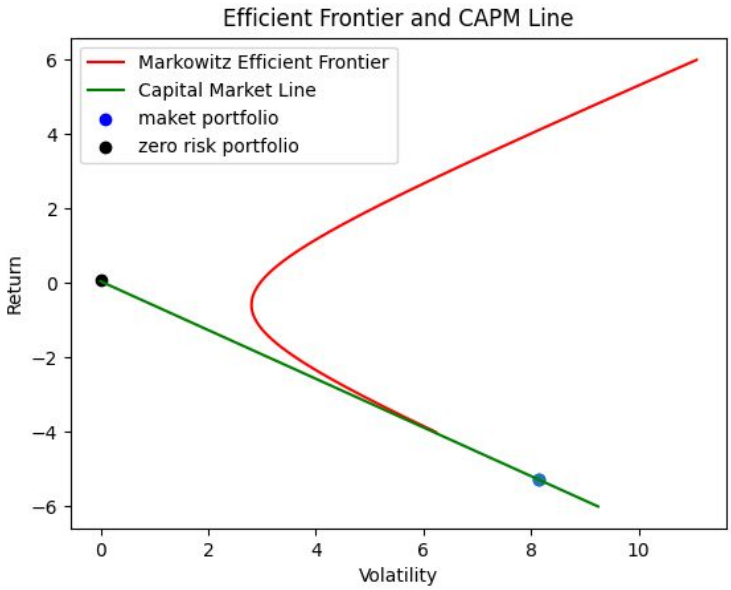
Ques.3

- To execute my .py file
  Run **$python3 180123029_NamanGoyal_q3.py** on the terminal. The snapshot is given below

```
~/Desktop/FE Labs/Lab04  python3 180123029_NamanGoyal_q3.py                    ✔  361  22:12:58
Solution (a)
------------------------------------------------------------------

Solution (b)
Market Portfolio for Risk Free Return 5%
Return:  8.139159  Risk:  -5.275625  W1:  0.4553620925259787  W2:  -0.043425  W3:  0.281593  W4:  -0
.096819  W5:  0.946936  W6:  -0.614538  W7:  0.003029  W8:  0.093237  W9:  -0.023774  W10:  -0.00160
1
------------------------------------------------------------------

Solution (c)
The plot for The Capital Line is shown
------------------------------------------------------------------

Solution (d)
The plots for the Security Line for 10 different assets are shown
------------------------------------------------------------------

~/Desktop/FE Labs/Lab04                                                        ✔  362  22:13:21
```

- The plots for Markowitz Efficient Frontier && Frontier v/s CAPM is shown:





- Here is the list of 10 companies stocks I take:
  - APPLE
  - AMAZON
  - TESLA
  - FACEBOOK
  - ALPHABET
  - IBM
  - NIKE
  - State Bank of India
  - Tata Motors
  - SAMSUNG
- Plot for Security Market line for all these 10 assets is shown: