Lab Assignment – 2

Write a code for the following:

Q1. Select three stocks at random from the Nifty index's fifty stocks and download monthly historical data for the past five years. In a single graph, plot the returns of all three stocks. Model the portfolio optimization problem using Markowitz model and do the following:

a) Randomly generate the 10000 combinations of weights w_1, w_2 and w_3 s.t. $w_1 + w_2 + w_3 = 1$ and $w_1, w_2, w_3 \geq 0$. Generate a scatter plot of risk vs return for all weight combinations.

b) Using the weighted sum approach, convert the portfolio optimization problem to a single-objective optimization problem. Solve the single optimization problem using the weighted sum approach for at least 20 different weight combinations (i.e. $\lambda_1, \lambda_2 \; and \; \lambda_3$) s.t. $w_1 + w_2 + w_3 = 1$ and $w_1, w_2, w_3 \geq 0$. Note that the weights of weighted sum approach and that of portfolio are different.

c) Write a general code and solve the following optimization problem for 3 different values of x.

Minimize: Portfolio Risk

Subjected to:

Portfolio Return = x %,

$w_1 + w_2 + w_3 = 1,$

$w_1, w_2, w_3 \geq 0.$

Note: Write a concise report that shows that you have done the assignments and reflected over the results obtained. Submit a zip file containing historical stock used in the assignment, codes, and report. The zip file name must be in the following format: *Name_Rollno_Assignment2*. The deadline to submit the zip file is 29/05/2022.