1. Consider three assets with the following mean return vector and covariance matrix:

$$\vec{\mu} = \begin{bmatrix} 0.1 & 0.25 & 0.15 \end{bmatrix},$$

$$C = \begin{bmatrix} 0.005 & -0.010 & 0.004 \\ -0.010 & 0.040 & -0.002 \\ 0.004 & -0.002 & 0.023 \end{bmatrix}.$$

   (A) Construct and plot the Markowitz efficient frontier using the above data.

   (B) Tabulate the weights, return and risk of the portfolios for $10$ different values on the efficient frontier.

   (C) For a $15$ % risk, what is the maximum and minimum return and the corresponding portfolios?

   (D) For a $18$ % return, what is the minimum risk portfolio?

   (E) Assuming the risk free return $\mu_{rf} = 8\%$, compute the market portfolio. Also determine and plot the Capital Market Line.

   (F) Find two portfolios (consisting of both risky and risk free assets) with the risk at $10\%$ and $25\%$.

2. Obtain data (from online resources) for 10 stocks each with 50 data points all taken at the same dates (preferably spread over a year at equal intervals). Put this data and it's details in a single Excel/CSV file. Using the data and assuming $5\%$ risk free return:

   (A) Construct and plot the Markowitz efficient frontier.

   (B) Determine the market portfolio.

   (C) Determine and plot the Capital Market Line.

   (D) Determine and plot the Security Market Line for all the $10$ assets.

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**Submission Deadline: 30th January 2025, 11:59 PM**