1. Load the supplied data from `s.csv`, containing daily returns for $N$ asset and $T$ days. Calculate its mean vector as $\mathbf{m} = \{E(s_1), E(s_2), \ldots, E(s_N)\}$, and its covariance matrix $\mathbf{K}$.

2. Generate a random portfolio vector $\mathbf{w} = \{w_1, w_2, \ldots, w_N\}$, where $\|\mathbf{w}\| = \sum_{i=1}^{N}|w_i| = 1$ and $-1 < w_i < 1$ (short selling is allowed).

   If we define $x(t) = \sum_{i=1}^{N} w_i s_i(t)$, then $x \sim N(\mu, \sigma)$ (CLT), where $\mu = \mathbf{w}^T \mathbf{m}$ and $\sigma^2 = \mathbf{w}^T \mathbf{K} \mathbf{w}$.

   Calculate $u$ to fulfill $P = P(x < u) = 0.01$.

   Display the expected daily return, the minimal daily return (with 1% uncertainty) and the variance of the given portfolio.

3. Determine the optimal portfolio to minimize the risk:

   $$\mathbf{w}_{opt} = \min_{\mathbf{w}} \frac{\mathbf{w}^T \mathbf{K} \mathbf{w}}{\mathbf{w}^T \mathbf{w}}$$

   The optimal portfolio can be calculated as that eigenvector of matrix $\mathbf{K}$ which belongs to the smallest non-zero (> $10^{-6}$) eigenvalue. Don’t forget to normalize this portfolio as well:

   $$\|\mathbf{w}\| = \sum_{i=1}^{N}|w_i| = 1.$$