EXERCISE 1

EXERCISE 2
Suppose $Y_1$ and $Y_2$ are the prices of two stocks and let $Y \sim N_2(\mu, \Sigma)$, where $Y = \begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix}$, $\mu = \begin{pmatrix} \mu_1 \\ \mu_2 \end{pmatrix}$, and $\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix}$. Find the mean vector and variance covariance matrix of the random vector $Z = \begin{pmatrix} Z_1 \\ Z_2 \end{pmatrix} = \begin{pmatrix} e^{Y_1} \\ e^{Y_2} \end{pmatrix}$.

EXERCISE 3
The covariance matrix $Q$ of the returns of two stocks has the following inverse:

```
> solve(Q)
[,1]      [,2]
[1,] 166.21139  -22.40241
[2,]  -22.40241 220.41076
```

Answer the following questions:

a. Find the composition of the minimum risk portfolio.

b. It is given that the minimum risk portfolio (point A on the graph below) has standard deviation equal to 0.0540825 and expected return equal to 0.01315856. Portfolio B (see graph below) has expected return equal to 0.01219724. What is the composition of portfolio B in terms of portfolio A and the risk free asset? Assume $R_f = 0.011$.

c. The standard deviation of portfolio B is equal to 0.03. Given this level of risk, can you do better than the expected return of portfolio B? Please explain.

Exercise 4
Show that two random variables $X$ and $Y$ cannot possibly have the following properties: $E(X) = 3, E(Y) = 2, E(X^2) = 10, E(Y^2) = 29,$ and $E(XY) = 0$. 