1. Generate N = 500, 2-D random data points and plot its corresponding Gaussian PDF.

$$f(x,y) = \frac{exp\left\{\frac{-1}{2(1-\rho^2)}\left[((x-\mu_x)/\sigma_x)^2 - 2*T\right]\right\}}{2\pi\sigma_x\sigma_y\sqrt{1-\sigma^2}} \tag{1}$$

$$T = \rho\left(\frac{x-\mu_x}{\sigma_x}\right)\left(\frac{y-\mu_y}{\sigma_y}\right) + \left(\frac{y-\mu_y}{\sigma_y}\right)^2 \tag{2}$$

2. Generate N = 500, 2-dimensional data points that are distributed according to the Gaussian distributionN(m,S), with mean $m = [0, 0]^T$ and covariance matrix

$$S_1 = \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{21} & \sigma_2^2 \end{bmatrix}$$

3. Considering iris dataset (Click here to download), D of size N × M, with N: number of samples and M: number of features, design a Bayesian classifier to classify the test data. Divide the dataset into training and testing data into (a) 70:30 ratio (b) 80:20 ratio, calculating the accuracy and error rate.

4. Considering a loss function L(y,a), pick the action with minimum expected loss (risk) for the following prior-probabilities

a \ y	None (ω1)	Lung Caner (ω2)	Breast Cancer (ω3)
Surgery	100	20	10
No Surgery	0	50	50