# Assignment 6

1. Generate the set of points A and B in $R^{2,}$ each consisting of 2000 data points from a bi-variate normal distribution. The set A and B has been drawn from the N ($\mu_1$, $\Sigma_1$ ) and N( $\mu_2$, $\Sigma_2$ ). Let us fix the $\mu_1$ = [-1,-1] and $\mu_2$ = [2,1]. Separate the 500 data points from each class as a testing set. Plot the optimal Bayesian decision boundary and compute the testing accuracy on test set for three following cases

   (A) $\Sigma_1 = \Sigma_2 = I.$

   $(B)$ $\Sigma_1 = \Sigma_2 = \begin{bmatrix} 1 & 0.6 \\ 0.6 & 1 \end{bmatrix}.$

   (C) $\Sigma_1 = \begin{bmatrix} 1 & 0.8 \\ 0.8 & 1 \end{bmatrix}$ $\Sigma_2 = \begin{bmatrix} 1 & 0.1 \\ 0.1 & 1 \end{bmatrix}.$

2. Consider the label of all points in set A as 1 and label of all points in set B as -1. Write a function implementing the logistic regression model using the gradient descent method. Obtain the best accuracy on the test set. Plot the decision boundary obtained by the logistic regression on test set.