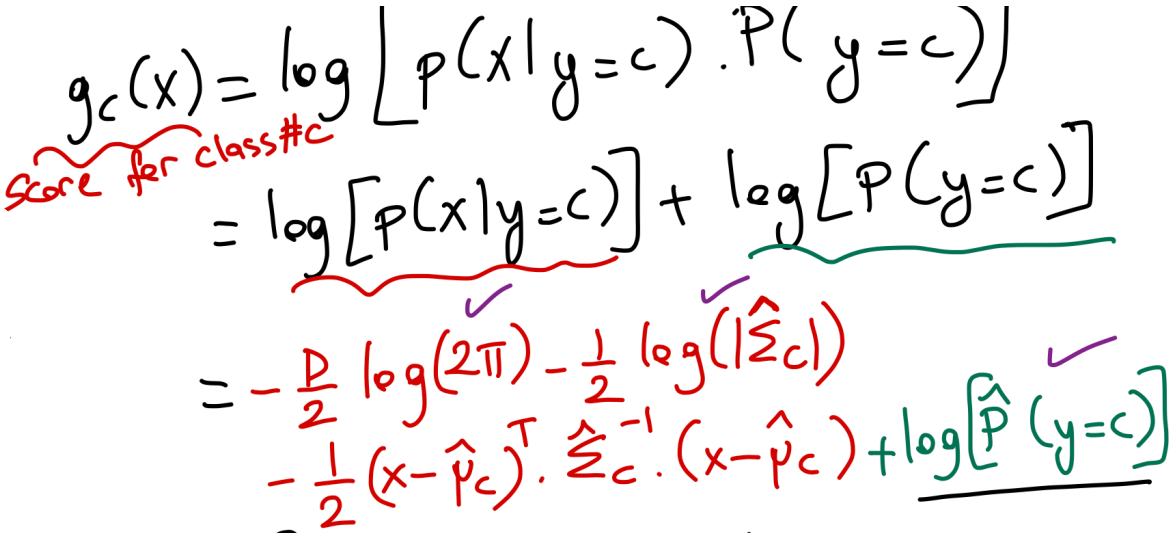
I first created the arrays for class means, covariances and class sizes. Then for data generation I used the *np.random.multivariate_normal* function. By giving the method these parameters for some random data obeying our distribution parameters, I obtained 3 classes of points. After this, as asked I plotted these data.

For the third task of the homework, I first calculated the sample means by summing all the values of a class and dividing it by the class size which all I stored in an array. To calculate the sample covariance which is the dot product of the difference between points and the sample means and this differences' transpose, summed for each point of the class and divided by the class size. To do this calculation I wrote a function and stored the results for all three classes in an array. For the last part of the third task, I calculated the prior probabilities of each class which is simply the class sizes divided by the total number of data points.

At the fourth task where we were asked to construct a confusion matrix, first I wrote a function for calculating the score function for each class using this formulation we learned about in the class:



I then concatenated all data points in an array and generated class labels in a different array at corresponding indices. Then, using the mentioned function to calculate scores I got the scores of all data points for each class.

Then I wrote another function to create an array of predicted y values (in other words predicted labels) by comparing the three scoring functions and assigning the prediction of the data point by the maximum score out of the score arrays of each class. Finally using the real values which are the labels I assigned previously and these newly predicted values of from the scores I constructed the confusion matrix.

Unfortunately I had no time to for visualization and marking the misclassified data points.