**Lab 2 – Neural Network - Perceptron**

1. Consider a neuron with 2 inputs, 1 output, and a threshold activation function. If the two weights are w1 = 1 and w2 = 1, and the bias is b = −1.5, then what is the output for input (0, 0)? What about for inputs (1, 0), (0, 1), and (1, 1)? Draw the discriminant function for this function, and write down its equation. Does it correspond to any particular logic gate? (No coding)
2. Work out the Perceptrons that construct logical NOT, NAND, and NOR of their inputs. (No coding)
3. Study Section 3.4.1. Then prove the same Perceptron Convergence Theorem using ||x|| <= R (instead of using ||x|| <= 1) for some constant R.
4. The Perceptron code on the website (<http://stephenmonika.net/> ) is a batch update algorithm, where the whole of the dataset is fed in to find the errors, and then the weights are updated afterwards, as is discussed in Section 3.3.5. Convert the code to run as sequential updates and then compare the results of using the two versions. (Modify existing Python program )
5. Study Section 3.4.4. This will give you a good idea about Prime Indian Dataset (<http://archive.ics.uci.edu/ml/datasets.html> - download it), how to plot various parts of it and then using Perceptron to see how well it can classify this data set. You can use the Perceptron code in #4 (or your modified version). This Section has all the key information so that you can run the Perceptron code on the given dataset.

**Run the Perceptron code, analyze the results and write your observation. Show the results – you can submit a plot of the results.**