# 520.340 Machine Intelligence on Embedded Systems

Homework Assignment #1

Elements of Computing and Learning in Artificial Neural Networks (Multi-layer Perceptrons)

**Question #1 (4.5 points):** Read the original paper by Rosenblatt on the Perceptron
(i) Train a single layer perceptron to learn a 3 input OR and AND function. Post the results and explain with the aid of a geometrical argument. explain why a single layer perceptron can not be trained to learn an XOR function.
(iI) Train a 2 input multilayer perceptron to learn the XOR function. Hints: 1. Think of perceptron logic functions as majority logic functions. You will need to have bias inputs in your neurons. 2. In your learning algorithm "adam" optimizer or stochastic gradient desscent (sgd) and "categorigal crossentropy" or "binary crossentropy" loss are good start points. 4. TFLearn and scikit-learn are useful frameworks that you may want to use. The latter does not necessitate TensorFlow runs in Python. 5. Jupyter notebooks are good way to do calculations and document results. Please submit a Jupyter notebook as your report.

**Question #2 (3 points):**
Please go through Chapters 1 through 4 in Tiny ML book to train a simple neural network model to predict a "sine-wave", convert the model into a quantized model with 8bit weights and produce the file sine_model_quantized.cc