CS503: ML
ANN Module Practice Questions

Q.1. Derive a gradient descent training rule for a single unit with output o, where

$$o = w_0 + w_1 x_1 + w_1 x_1^2 + \ldots + w_n x_n + w_n x_n^2$$

Q.2. Construct a multi-layer perceptron that uses thresholding as the activation function for modelling the following Boolean function: $X_1 \wedge (X_2 \vee \neg X_3)$.

Q.3. A multi-layer perceptron M has been trained using one hidden layer (that uses tanh as the activation function) and the output layer uses identity function. We design a new multi-layer perceptron M' from M that reverses the sign of the weights from the input to the hidden layer and from hidden to output layer. Show that M and M' are equivalent in the sense that the output of the networks are identical for the same input.

Q.4. Derive the weight update equation for the weights (any one weight) of then connections from the input layer to the first hidden layer, where both the hidden layers employ sigmoid activation and the output layer uses identity function.