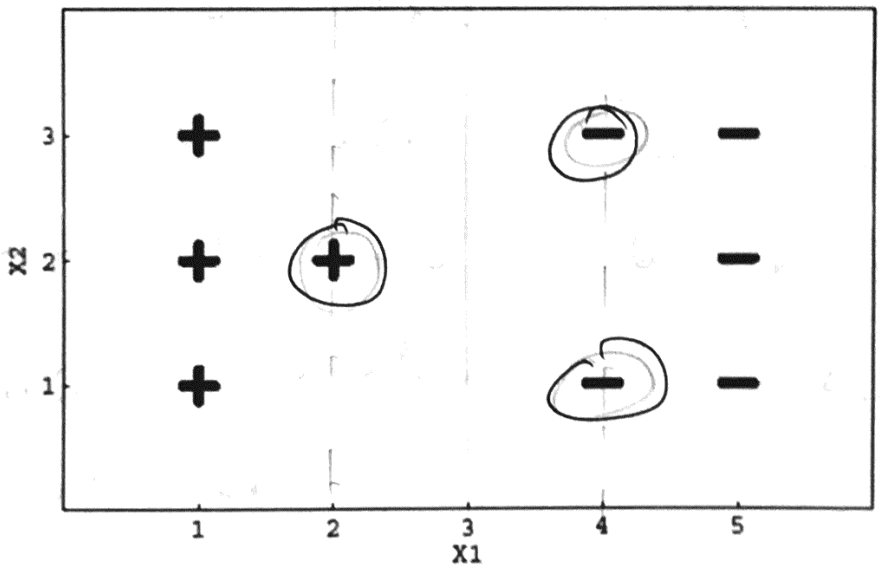
CS 6375 Homework Assignment 3 - Due Monday March 2, 2020

a. 5 points Please provide a neural network that will encode the following function of three binary variables $(x_1 \wedge x_2) \vee (x_2 \wedge \neg x_3)$. Indicate the weights clearly for each connection.

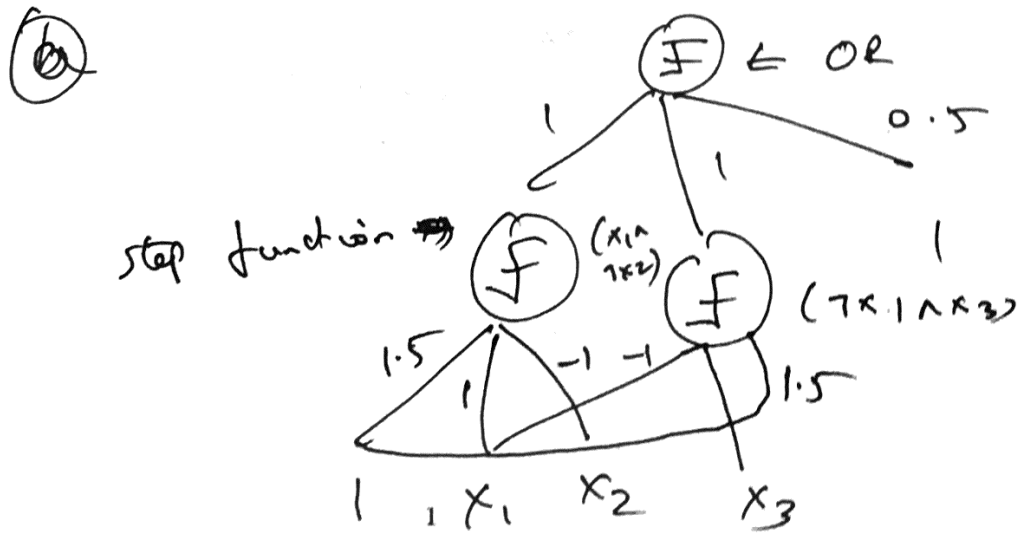
b. 5 points This has two parts: (a) why is it a good idea to initialize the weights to be close to zero? (b) Why is it a bad idea to initialize all the weights to zero?

c. 5 pointsDraw the decision boundary when the value of $C > 0$. Explain your reasoning.



d. (5 points) For the same Figure, circle the examples such that removing them from the training set and retraining the SVM would result in a different decision boundary than training on the original full sample. Explain your reasoning.

e. (5 points) What is the effect of C in overfitting? Speculate about the different values of $C = \langle 0.001, 0.1, 1, 10, 100 \rangle$.



(b) (i) Near zero will allow gradients to quickly go to +ve or -ve value for weights.

(ii) All weights to zero will result in learning one function. we need different functions at different nodes. [Symmetry will not be broken].

(c) .001 → underfitting

overfitting increases

100 → overfitting