Name:

NetID:

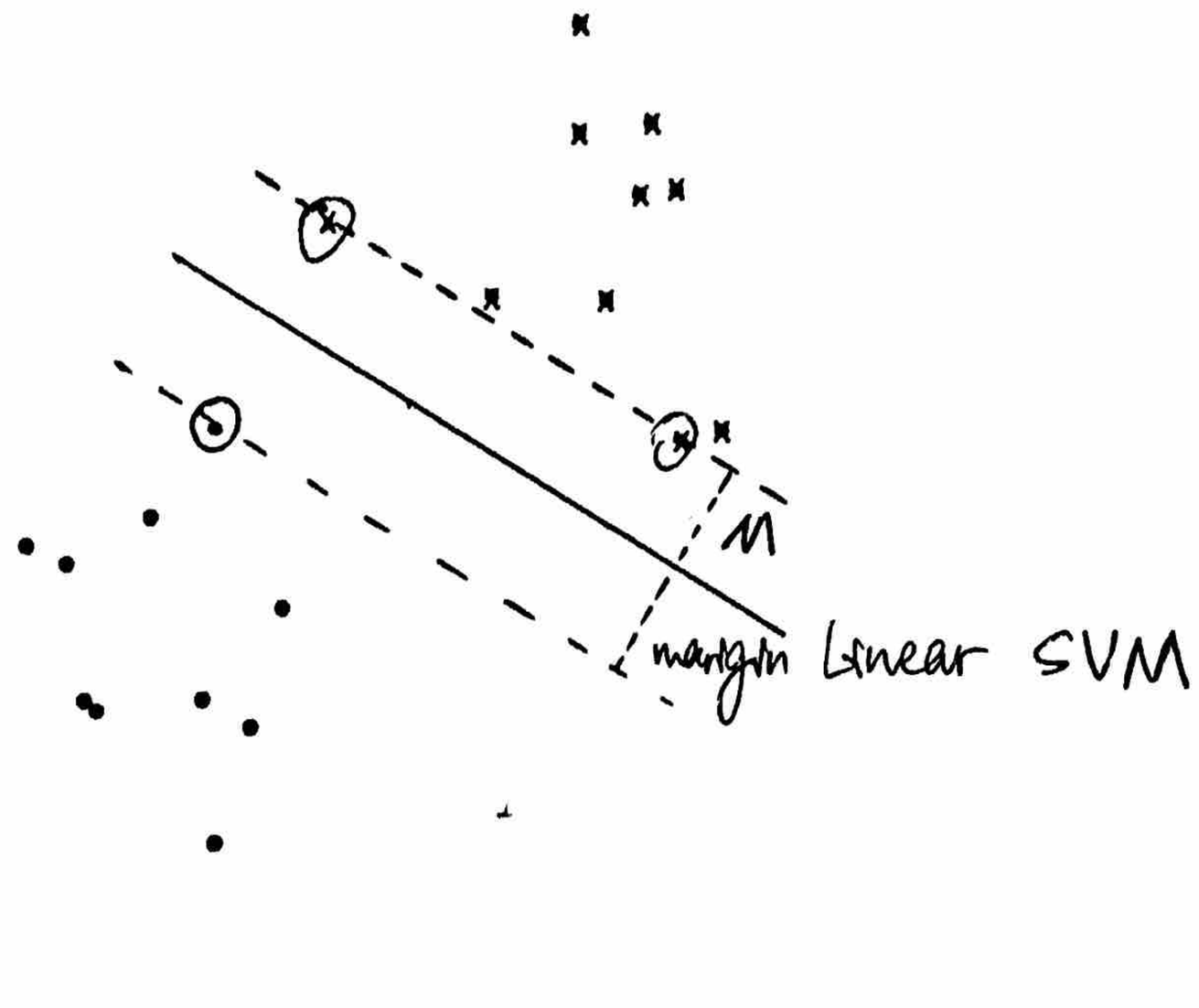
ECE398BD - Quiz 2
February 3, 2016
Time: 20 minutes
Please print your answers neatly (especially if you have poor handwriting).

Problem 1 *Linear SVM* [10 points]

Draw the linear SVM classifier in the picture below. The data is linearly separable. Circle the support vectors (i.e. the vectors which determine the SVM) [3 points]. Make sure to clearly indicate which hyperplane (line) is the SVM classifier (and why it is the SVM classifier – you can use words for this) [4 points] and mark the boundaries of the margin [3 points]. You will need a ruler for this problem.

Hint 1: There are two support vectors for the x class and one support vector for the plain dot class. It will help to draw the boundary of the margin on the x class first.

Hint 2: To indicate why the hyperplane you drew is the SVM classifier, you can fill in the blanks: The hyperplane I drew is the linear SVM classifier because it maximizes the margin M.



Problem 2 *Model Selection and Assessment* [10 points]

Answer in a few complete sentences.

1. What is purpose of a training set, validation set and test set? [6 points]
2. Why would you use cross-validation? [4 points]

1. Read Section 3.1 in notes.

2. Section 3.2 in notes.

Problem 3 *Kernel Trick* [10 points]

Why would you want to use a kernel trick? Answer in 1-2 complete sentences.

1. Non linear mapping from feature space to higher dimensional space can make the training data more separable.
2. Using the kernel function in place of dot product in new space can greatly simplify classifier design.