

Problem Set: Support Vector Classifier

1. Suppose we have the following data points:

$$x_1 = (0, 0), x_2 = (0, 1), x_3 = (-1, 0), x_4 = (1, 0) \text{ with} \\ y_1 = -1, y_2 = -1, y_3 = 1, y_4 = 1.$$

- a) Find the soft margin hyperplane (with tuning parameter $C=2$) and identify any support vectors.
 - b) Repeat with $C=4$.
 - c) Repeat with $C=1$.
2. Suppose we have the following data points:

$$x_1 = (0, 1), x_2 = (0, -1), x_3 = (0, 0), x_4 = (1, 1), x_5 = (1, -1) \text{ with} \\ y_1 = 1, y_2 = 1, y_3 = -1, y_4 = -1, y_5 = -1.$$

- a) Find the soft margin hyperplane (with tuning parameter $C=2$) and identify any support vectors.
- b) Repeat with $C=4$.
- c) Repeat with $C=1$.