

Problem Set Problem set number

My name

Handed In: Hand in date

1. SVM

- (a)
1. $\mathbf{w} = [-1, 0]^T$
 $\theta = 0$
 2. $\mathbf{w} = [-0.5, 0.25]^T$
 $\theta = 0$
 3. I found the two closest positive/negative points, $[(-1.2, 1.6), +], [(2, 0), -]$, and found the slope between them, $\frac{1.6}{-3.2} = -\frac{1}{2}$, and the midpoint, $(0.4, 0.8)$, so the line with the farthest distance between the two points (the support vectors), has a slope of 2 with a point $(0.4, 0.8)$, giving the line $y = 2x$, which gives $w = [-2, 1]^T, \theta = 0$.

Then, I just minimized w by halving it repeatedly, until I got $w = [-0.5, 0.25]$. This w gave $y(w^T x + \theta) = 1$ for both support vectors, so I know this is the smallest value of w I can get.

- (b)
1. $I = \{1, 6\}$
 2. $\alpha = \left\{ \frac{5}{32}, \frac{5}{32} \right\}$
 3. Objective function value $= \frac{5}{32}$.

2. Answer to problem 2

3. Answer to problem 3