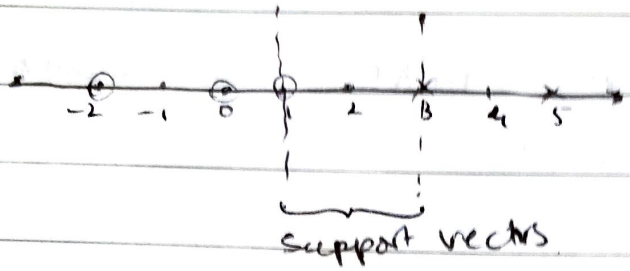
PSET 14 P01

④ class 1 ($y_i = +1$) = $\{7, 9, 5, 3\}$

class 2 ($y_i = -1$) = $\{-2, 0, -3, 1\}$

1.



1. ~~From~~ ~~From a~~ Since it is a 1D problem space, the classifier lies in between the extremities of both classes, and the extremities are themselves the support vectors.

$x = 1, \quad x = 3.$

2. $w = \sum_{i=1}^{N} \alpha_i y_i \bar{x}_i = 1$

$\alpha_1 (-1)(1) + \alpha_2 (1)(3) = 1$

$-\alpha_1 + 3\alpha_2 = 1$

Given constraint $\sum \alpha_i y_i = 0$; $\alpha_1 (-1) + \alpha_2 (1) = 0$

$\therefore \alpha_1 = \alpha_2$

or $\alpha = \frac{1}{2}$.

classifier = $\text{sign}(w^T x + b)$

here, $b = -(1+3/2) = -2$.

$\therefore \quad w = 1, \quad b = -2$

3. $\alpha = 0$ for all non support vectors.

And as we saw in part 2, $\alpha_1 = \alpha_2 = \frac{1}{2}$.

$\therefore$ $\alpha_4 = \alpha_6 = \alpha_5 = \alpha_0 = \alpha_{-2} = \alpha_{-8} = 0$

$\alpha_1 = \alpha_3 = \frac{1}{2}$.