

Problem 4

a. $D_{\text{train}} = \begin{Bmatrix} [1, 0] \\ [2, 1] \\ [0, 0] \\ [0, 2] \end{Bmatrix}$

1. $\mu_1 = [0, -1]$ $\mu_2 = [2, 2]$

iter:	$\ \phi(x_i) - \mu_1 \ ^2$	$\ \phi(x_i) - \mu_2 \ ^2$
step 1:		
x_1	$[1, 1] \Rightarrow 2$	$[-1, -2] \Rightarrow 5$
x_2	$[2, 2] \Rightarrow 8$	$[0, -1] \Rightarrow 1$
x_3	$[0, 1] \Rightarrow 1$	$[-2, -2] \Rightarrow 8$
x_4	$[0, 3] \Rightarrow 9$	$[2, 0] \Rightarrow 4$

$z_1 = 1$ $z_2 = 1$ $z_3 = 1$ $z_4 = 2$

step 2: $\mu_1 = \frac{1}{2}([1, 0] + [0, 0]) = \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \mu_1$

$\mu_2 = \frac{1}{2}([2, 1] + [0, 2]) = \begin{bmatrix} 1 \\ \frac{3}{2} \end{bmatrix} = \mu_2$