

## Question 2

W	R1	R2	0.25
1, 1	1/10	0.25	0.0625
2, 4	1/10	0.0625 (1/16)	
4, 5	1/10	0.0625	
5, 3	1/10	0.0625	
5, 6	1/10	0.0625	...
6, 2	1/10	0.25	
7, 6	1/10	0.0625	
8, 3	1/10	0.0625	
8, 8	1/10	0.0625	
10, 5	1/10	0.0625	

if  $x > 2$ , classify to the left +1 ( $C_1$ )

if  $x < 2$ , classify to the left -1 ( $C_0$ )

$E = E_{w_i}$ ; Pick lowest error,  $\alpha = \frac{1}{2} \ln \left( \frac{1-E}{E} \right)$

Weight update =  $\begin{cases} 1/2 \cdot 1/1-E \cdot w_{old} & \text{correct} \\ 1/2 \cdot 1/E \cdot w_{old} & \text{incorrect} \end{cases}$

Pick Boundaries eyeballing it I think  $x_1 = 4.5$   $x_2 = 5.5$  and  $x_2 = 2.5$  should be the best

	Misses	E
$x_1 > 4.5$	85	1/2
$x_2 > 5.5$	23	3/10
$x_2 > 2.5$	2	2/10
$x_1 < 4.5$	25	1/2
$x_2 < 5.5$	87	7/10
$x_2 < 2.5$	8	8/10

after round 1 pick  $h = x_2 > 2.5$ ,  $E = 1/5$ ,  $\alpha = 0.693$

after round 2 pick  $h = x_1 > 4.5$ ,  $E = 1/50$ ,  $\alpha = 1.946$

after round 3 pick  $h = x_2 > 5.5$ ,  $E = 3/50$ ,  $\alpha = 1.376$

$$H(x_1, x_2) = \text{sign} \left( 1.946(h_1(x_1 > 4.5)) + 1.376(h_2(x_2 > 5.5)) + 0.693(h_3(x_2 > 2.5)) \right)$$