AND outputs 1 when both inputs are 1, otherwise outputs 0

$\theta = 0.2$ $\alpha = 0.15$

$w_{new} = w_{old} + \alpha (Y_d - Y) x_i$

Epoch 1:

1) $x_1 = 0$ $x_2 = 0$ $w_1 = 0.4$ $w_2 = -0.2$

weighted sum $= 0.4(0) + (-0.2)0 = 0 < \theta$ $Y = 0$

no error

2) (0,1) weighted sum $= 0.4(0) + (-0.2)(1)$

$= -0.2 < \theta$ $Y = 0$

no error weights are same

3) (1,0) weighted sum $= 0.4(1) + (-0.2)(0) = 0.4 > \theta$ $Y = 1$

an error

$w_1 = 0.4 + 0.15(0 - 1)1 = 0.25$

$w_2 = -0.2 + 0.15(0 - 1)0 = -0.2$

4) (1,1) $Y_D = 1$ $w_1 = 0.25$ $w_2 = -0.2$

weighted sum $= 0.25(1) + (-0.2)1$

$= 0.05 < \theta$ $Y = 0$

error update weights

$w_1 = 0.25 + 0.15(1 - 0)(1) = 0.4$

$w_2 = -0.2 + 0.15(1 - 0)(1) = -0.05$

$\theta = 0.2$

$w_{new} = w_{old} + \alpha (y_D - y) x_i$

Epoch 2: $w_1 = 0.4$ $w_2 = -0.05$

1) (0,0) $y_D = 0$

weighted sum $= 0.4(0) + (-0.05)0 = 0 < \theta$ $y = 0$

no error

2) (0,1) $y_D = 0$

weighted sum $= 0.4(0) + (-0.05)1 = -0.05 < \theta$ $y = 0$

no error

3) (1,0) $y_D = 0$

weighted sum $= 0.4(1) + (-0.05)0 = 0.4 > \theta$ $y = 1$

an error ∴ update weights

$w_1 = 0.4 + 0.15(0-1)1$

$= 0.4 - 0.15 = 0.25$

$w_2 = -0.05 + 0.15(0-1)(0) = -0.05$

4) (1,1) $y_D = 1$

weighted sum $= 0.25(1) + (-0.05)1$

$= 0.2 = \theta$ $y = 1$ no error

Epoch 3:

$w_1 = 0.25 \qquad w_2 = -0.05$

1) $(0, 0) \qquad Y_D = 0$

weighted sum $= (0.25)(0) + (-0.05)0 = 0 < \theta \quad Y = 0$

no error

2) $(0, 1) \qquad Y_D = 0$

weighted sum $= 0.25(0) + (-0.05)1 = -0.05 < \theta \quad Y = 0$

no error

3) $(1, 0) \qquad Y_D = 0$

weighted sum $= (0.25)(1) + (-0.05)0 = 0.25 > \theta \quad Y = 1$

error $\Rightarrow$ update weights

$w_1 = 0.25 + 0.15(0 - 1)1 = 0.1$

$w_2 = -0.05 + 0.15(0 - 1)0 = -0.05$

4) $(1, 1) \qquad Y_D = 1$

weighted $= 0.1(1) + (-0.05)(1) = 0.05 < \theta \quad Y = 0$

error so update weights

$w_1 = 0.1 + 0.15(1 - 0)(1) = 0.25$

$w_2 = -0.05 + 0.15(1 - 0)(1) = 0.1$

Epoch 4 : $w_1 = 0.25$ $w_2 = 0.1$

1) (0,0) $Y_D = 0$

weighted sum = $0.25(0) + 0.1(0) = 0 < \theta$ $Y = 0$

no error

2) (0,1) $Y_D = 0$

weighted = $0.25(0) + (0.1)(1) = 0.1 < \theta$ $Y = 0$

no error

3) (1,0) $Y_D = 0$

weighted sum = $0.25(1) + (0.1)(0) = 0.25 > \theta$ $Y = 1$

error so update weights

$w_1 = 0.25 + 0.15(0 - 1)(1)$

$= 0.25 - 0.15 = 0.10$

$w_2 = 0.1 + 0.15(0-1)0 = 0.1$

4) (1,1) $Y_D = 1$

weighted = $0.1(1) + 0.1(1) = 0.2$ $Y = 1$

no error

Epoch 5: $w_1 = 0.1$ $w_2 = 0.1$

1) (0,0) $Y_0 = 0$

weighted = $0.1(0) + 0.1(0) = 0 < \theta$ no error $Y = 0$

2) (0,1) $Y_D = 0$

weighted = $0.1(0) + (0.1)(1) = 0.1 < \theta$ $Y = 0$

no error

3) (1,0) $Y_D = 0$

weighted = $0.1(1) + (0.1)(0) = 0.1 < \theta$ $Y = 0$

∴ no error

4) (1,1) $Y_D = 1$

weighted = $0.1(1) + 0.1(1) = 0.2$ $Y = 1$

no error