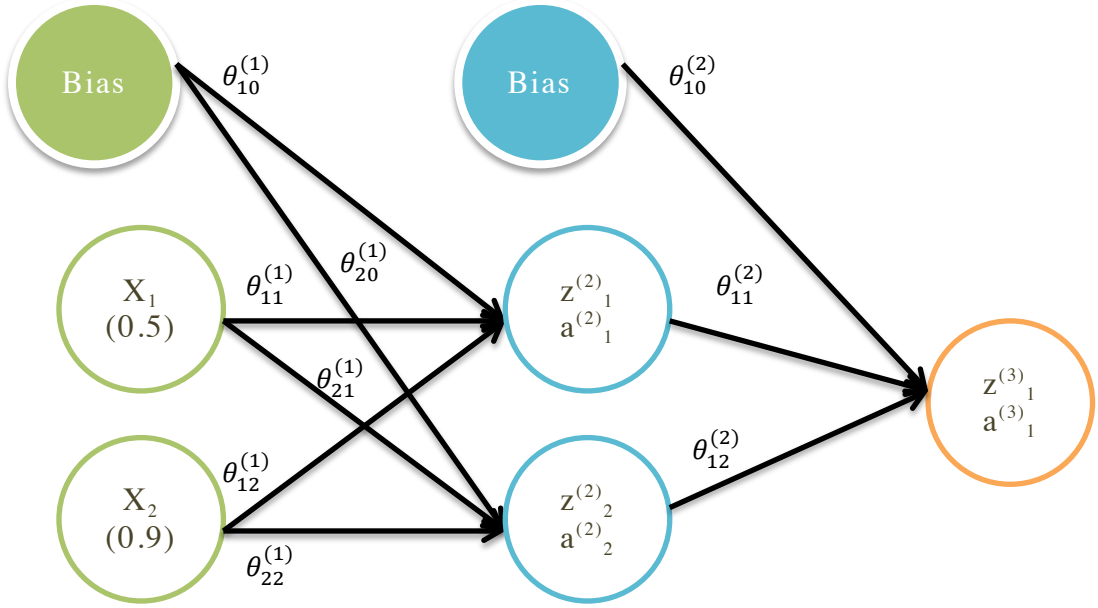


3)

1.

$$z_1^{(2)} = \theta_{10}^{(1)} + \theta_{11}^{(1)}x_1 + \theta_{12}^{(1)}x_2 = 0.2 + 0.5 * 0.5 + 0.9 * 0.5 = 0.9$$

$$a_1^{(2)} = \frac{1}{1+e^{-z_1^{(2)}}} = \frac{1}{1+e^{-0.9}} = 0.7109$$

$$z_2^{(2)} = \theta_{20}^{(1)} + \theta_{21}^{(1)}x_1 + \theta_{22}^{(1)}x_2 = 0.2 + 0.1 * 0.5 + 0.7 * 0.9 = 0.88$$

$$a_2^{(2)} = \frac{1}{1+e^{-z_2^{(2)}}} = \frac{1}{1+e^{-0.88}} = 0.7068$$

$$z_1^{(3)} = \theta_{10}^{(2)} + \theta_{11}^{(2)}x_1 + \theta_{12}^{(2)}x_2 = 0.2 + 1 * 0.7109 + 2 * 0.7068 = 2.3245$$

$$a_1^{(3)} = \frac{1}{1+e^{-z_1^{(3)}}} = \frac{1}{1+e^{-2.3245}} = 0.9109$$

2.

$$\delta_1^{(3)} = a_1^{(3)} - 1 = 0.9109 - 1 = -0.0891$$

$$\delta_2^{(2)} = \theta_{12}^{(2)} * a_2^{(2)} * \left(1 - a_2^{(2)}\right) = 2(0.7068)(1 - 0.7068) = 0.4145$$

$$\delta_1^{(2)} = \theta_{11}^{(2)} * a_1^{(2)} * \left(1 - a_1^{(2)}\right) = 1(0.7109)(1 - 0.7109) = 0.2055$$

$$\theta_{11}^{(2)} = \theta_{11}^{(2)} + a_1^{(2)}\delta_1^{(3)} = 1 + 0.7109(-0.0891) = 0.9367$$

$$\theta_{12}^{(2)} = \theta_{12}^{(2)} + a_2^{(2)}\delta_1^{(3)} = 2 + 0.7068(-0.0891) = 1.9370$$

$$\theta_{11}^{(1)} = \theta_{11}^{(1)} + a_1^{(1)}\delta_1^{(2)} = 0.5 + 0.5(0.2055) = 0.6028$$

$$\theta_{21}^{(1)} = \theta_{21}^{(1)} + a_1^{(1)}\delta_2^{(2)} = 0.1 + 0.5(0.4145) = 0.3073$$

$$\theta_{12}^{(1)} = \theta_{12}^{(1)} + a_2^{(1)}\delta_1^{(2)} = 0.5 + 0.9(0.2055) = 0.6850$$

$$\theta_{22}^{(1)} = \theta_{22}^{(1)} + a_2^{(1)}\delta_2^{(2)} = 0.7 + 0.9(0.4145) = 1.7031$$

4)

1.

(-1,0) and (0,2), $m = \frac{2-0}{0-(-1)} = 2$, $x_2 = 2x_1 + c$, $0 = -2 + c$, $c = 2$,

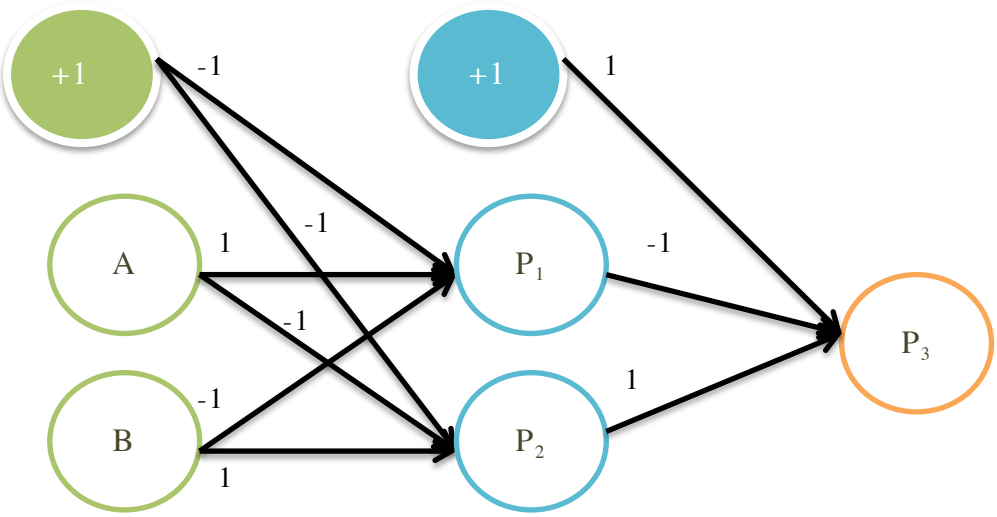
$$\boldsymbol{x_2 = 2x_1 + 2}, w_0 = -2, w_1 = -2, w_2 = 1$$

2a.

A	~B	A∧~B
1	-1	-1
1	1	1
-1	-1	-1
-1	1	-1

$w_0 + Aw_1 + Bw_2 = 0,$
$1 - A + B = 0,$
$w_0 = -1, w_1 = 1, w_2 = -1$

2b.

A	B	AXORB
-1	-1	-1
-1	1	1
1	-1	1
1	1	-1

$1 + A + B = 0,$
$w_0 = -1, w_1 = -1, w_2 = 1$