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CSC 578 - Spring 2022
Homework #1

1. A)

A	B	A ∧ ¬B
-1	-1	-1
-1	1	-1
1	-1	1
1	1	-1
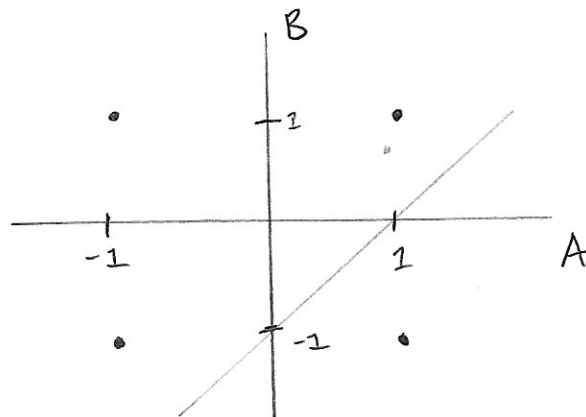
$$\frac{A-\emptyset}{1-\emptyset} = \frac{B-(-1)}{\emptyset-(-1)}$$

weights are 1, -1, 1

1. B)

A XOR B = (A ∧ ¬B) ∨ (¬A ∧ B)

A ——1——> A ∧ ¬B

-1

-1

B ——1——> ¬A ∧ B

A ∧ ¬B ——.5——> output ——> A XOR B

¬A ∧ B ——.5——> output

2.)
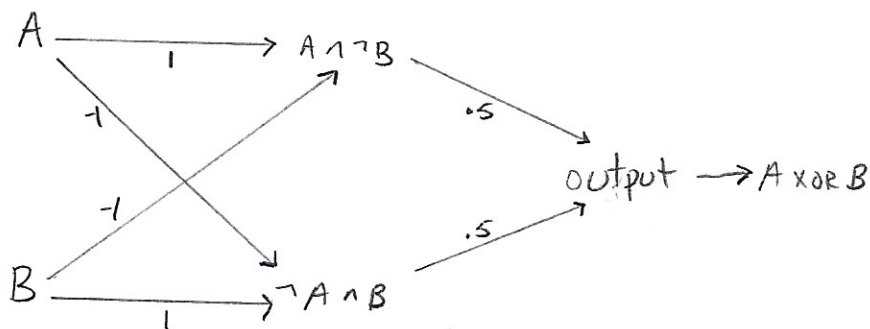
$$O = w_0 + w_1 x_1 + w_1 x_1^2 + \dots + w_n x_n + w_n x_n^2$$

$$\frac{\partial E}{\partial w_1} = \frac{\partial}{\partial w_i} \frac{1}{2} \sum (t_d - o_d)^2$$

$$= \frac{1}{2} \sum 2(t_d - o_d) \frac{\partial}{\partial w_1} (t_d - o_d)$$

$$= \sum (t_d - o_d) \frac{\partial}{\partial w_1} (t_d - w \cdot x)$$

$$= \sum (t_d - o_d) \frac{\partial}{\partial w_1} (t_d - (w_0 + w_1 x_1 + w_1 x_1^2 + \dots + w_n x_n + w_n x_n^2))$$

$$= \sum (t_d - o_d)(-t_d - t_d^2)$$