COMP305: Homework 2
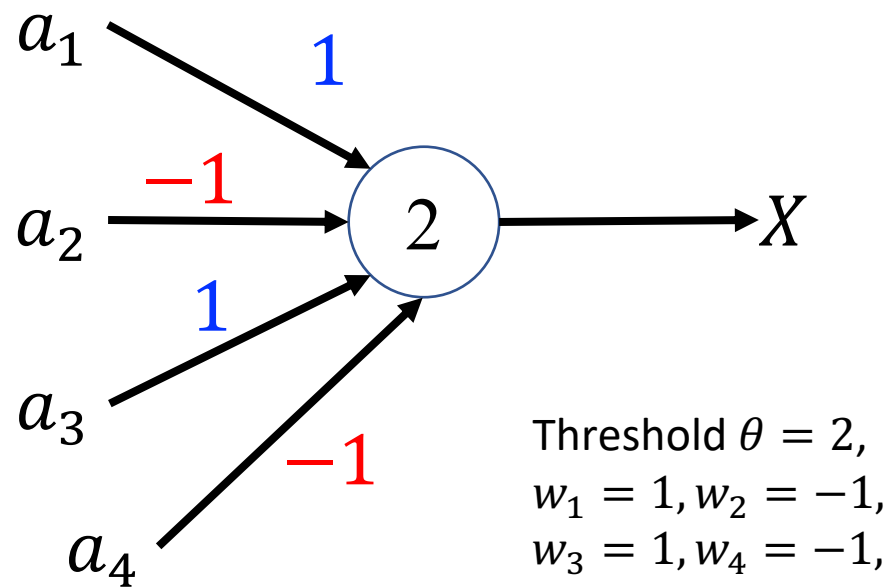
1. Q: Describe the motivation of having a discrete-time, binary inputs for a MP neuron.

2. Consider the following MP neuron.

a_1 —1→

a_2 —-1→ 2 →X

a_3 —1→

a_4 —-1→

Threshold $\theta = 2$,
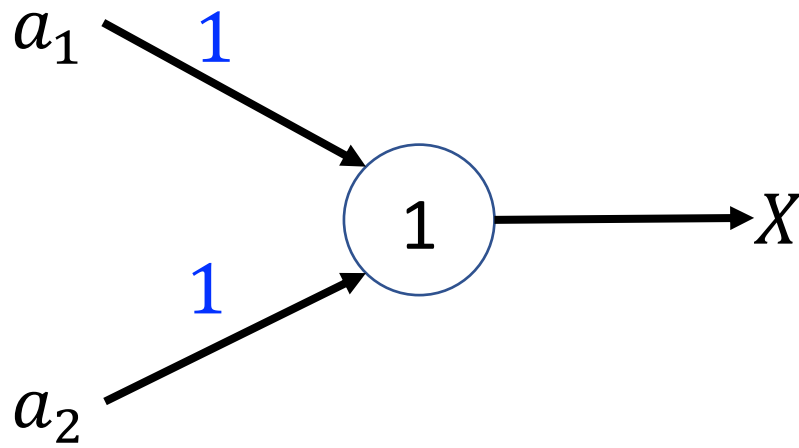$w_1 = 1, w_2 = -1$,
$w_3 = 1, w_4 = -1$,

Q2.1: compute the output when $a_1 = 1, a_2 = 1, a_3 = 1, a_4 = 1$.

Q2.2: compute the output when $a_1 = 0, a_2 = 0, a_3 = 1, a_4 = 0$.

Q2.3: provide an input case such that the neuron is excited ($X = 1$).

3. Q: Please proof the equivalence of the logic function "OR" with two inputs, i.e., $a_1 \vee a_2$, and the following MP neuron.

4. Can the following linear separable function indicated in the figure be represented by an MP neuron (the function outputs false on the red points and outputs true on the purple points)? Explain your answer: If yes, show the MP neuron and prove the equivalence; If no, prove your conclusion.

a_2

(0,1)   (1,1)

(0,0)   (1,0)

a_1