# COMP305: Homework 3

1. Q: Construct a MP neural network that is equivalent to $!\big(a \vee (b \wedge c \wedge d)\big)$.

2. Q: What is the difference between a MP neuron and the neuron model considered in Hebb's learning rule.

3. Q: Given an initialized neuron model, assume that all the (training) inputs are from a data set A, and at least one none-zero input in A can fire the initialized neuron. Each time step we randomly pick an input from A to train a neuron model with the original Hebb's rule. Will the learning (training) process converge, i.e., after finite time steps, the weights will remain the same? Please prove your conclusion.

4. At time step t, a neuron model looks like follows.
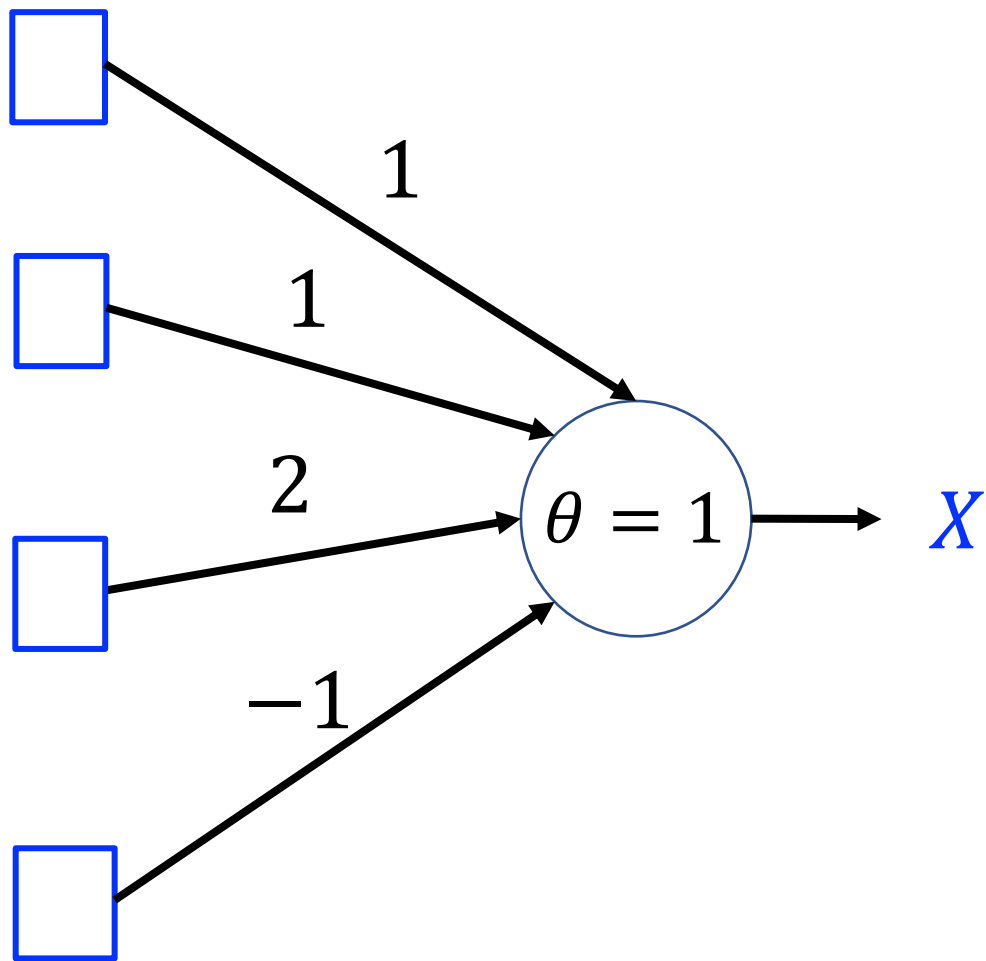
We use an input $[1,1,0,1]$ to train this neuron with the original Hebb's rule, where the learning rate $c = 0.1$. Please show the status of the neuron at time step t+1.