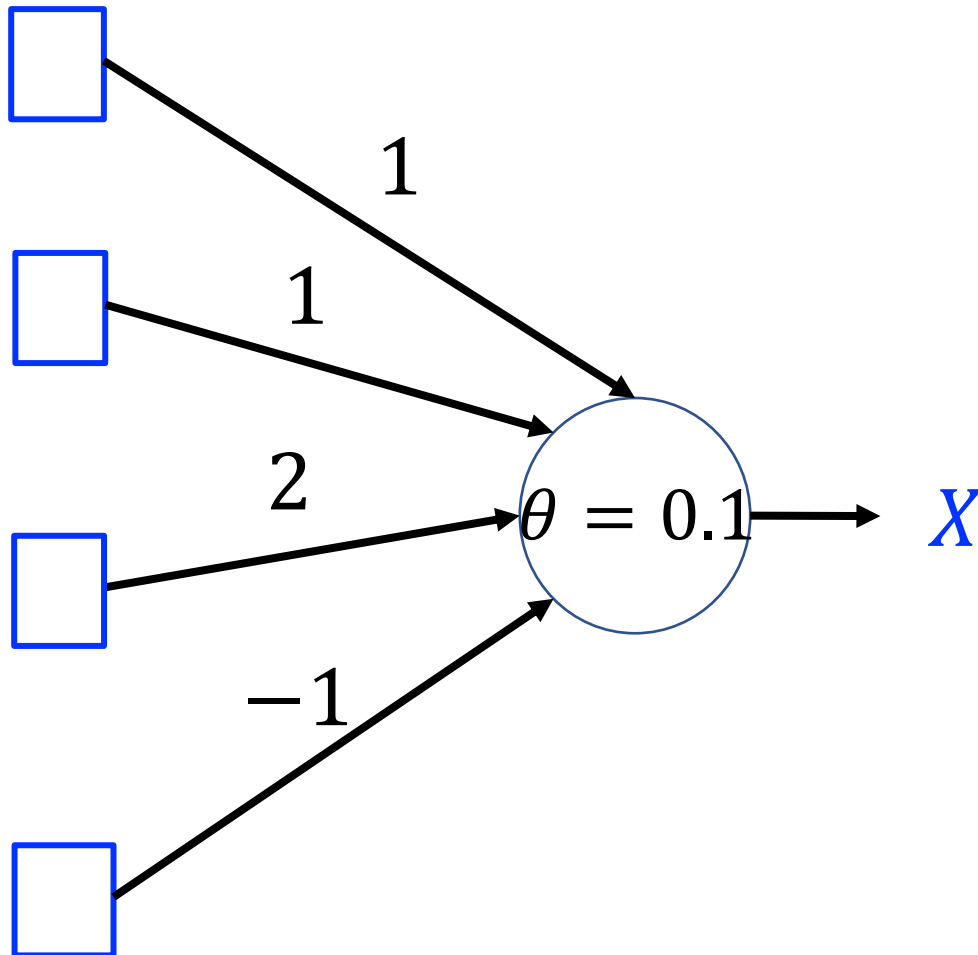


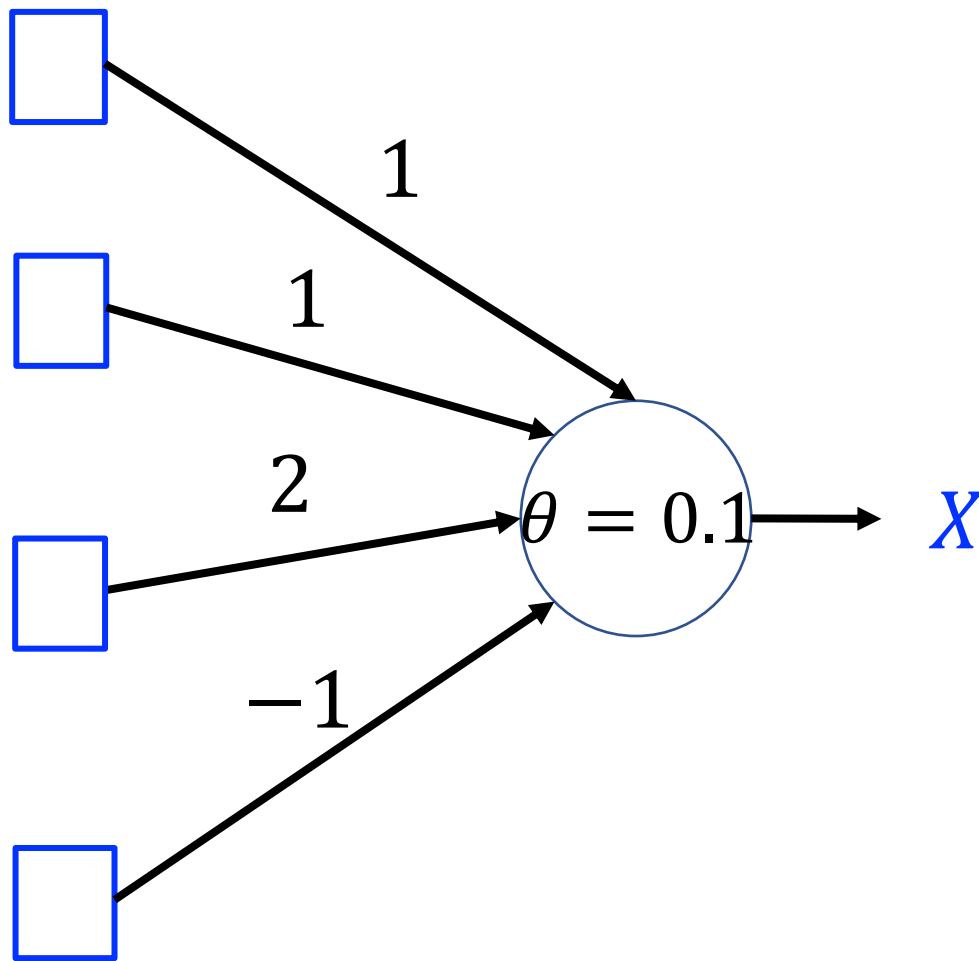
COMP305: Homework 4

1. Q: At time step 0, a neuron model is set as follows.



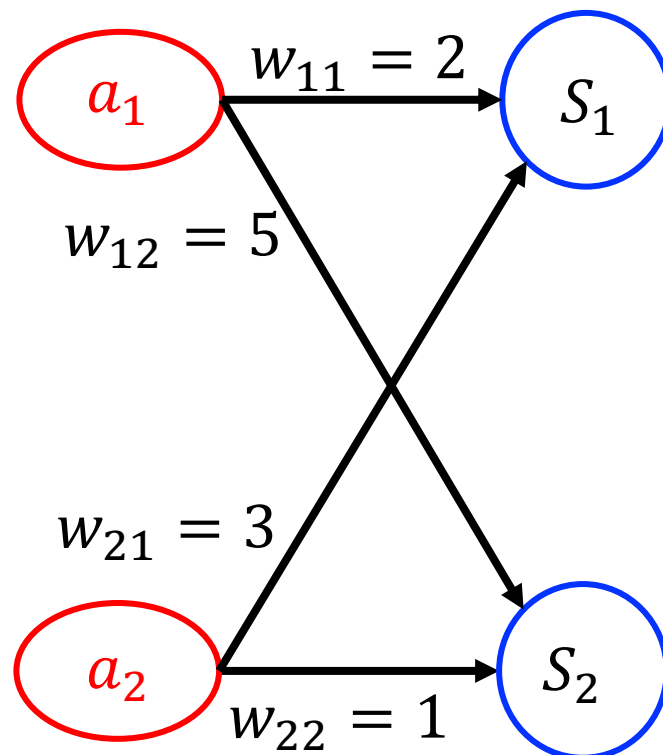
We use an input $[1,1,0,1]$ to train this neuron with the normalized Hebb's rule (Oja's rule), where the learning rate $c = 0.1$, the small positive number in the convergence criteria $\delta = 0.0001$. Please show the status of the neuron being ready to accept an input at time step 1.

2. Q: At time step 0, a neuron model is set as follows.



We keep using a single input $[1,1,0,1]$ to train this neuron with the normalized Hebb's rule (Oja's rule), where the learning rate $c = 0.1$, the small positive number in the convergence criteria $\delta = 0.0001$. Will the learning process converge? If so, what will the weight vector be after the learning terminates?

3. Q: At time step 0, a two-layer neural network is set as follows.



We use an input $[1,2]$ to train this neuron with the Kohonen learning rule, where the learning rate $c = 0.1$. Please show the status of the neural network at time step 1.