

# HackerRank Quiz Questions

(Reinforcement Learning and Deep Learning)

**Q1. Now let's revise the previous slides. We have learned that:**

- A neural network is a (crude) mathematical representation of a brain, which consists of smaller components called neurons.
- Each neuron has an input, a processing function, and an output.
- These neurons are stacked together to form a network, which can be used to approximate any function.
- To get the best possible neural network, we can use techniques like gradient descent to update our neural network model.

**Given above is a description of a neural network. When does a neural network model become a deep learning model?**

- A. When you add more hidden layers and increase depth of neural network
- B. When there is higher dimensionality of data
- C. When the problem is an image recognition problem
- D. None of these

**Solution: (A)**

More depth means the network is deeper. There is no strict rule of how many layers are necessary to make a model deep, but still if there are more than 2 hidden layers, the model is said to be deep.

**Q2. Given below is an input matrix named I, kernel F and Convolved matrix named C. Which of the following is the correct option for matrix C with stride =2 ?**

I							
1	0	0	1	1	0	1	
0	0	1	1	1	0	1	
1	1	1	0	1	0	1	
1	1	0	1	0	0	0	
1	0	1	0	1	1	0	
0	1	1	0	0	1	1	
0	1	1	1	0	1	1	

F		
1	0	0
0	1	1
1	1	0

A) 

4	4	3	3	3
4	2	3	3	2
3	3	3	1	3
3	4	2	3	2
4	3	3	2	4

B) 

4	4	3	3	3
4	2	3	2	2
3	2	3	3	3
3	4	2	3	2
4	3	2	2	4

C) 

4	3	3
3	3	3
4	3	4

D) 

4	3	3
3	2	2
3	3	4

**Solution:**

1 and 2 are automatically eliminated since they do not conform to the output size for a stride of 2. Upon calculation option 3 is the correct answer.

**Q3. Q-learning can learn the optimal Q-function  $Q^*$  without ever executing the optimal policy.**

A) True

B) False

**Solution:** True. It may not even be able to represent the optimal policy

**Q4: MDPs** For this question, assume that the MDP has a finite number of states.

(i) [true or false] For an MDP  $(S, A, T, \gamma, R)$  if we only change the reward function  $R$  the optimal policy is guaranteed to remain the same.

(ii) [true or false] Value iteration is guaranteed to converge if the discount factor  $(\gamma)$  satisfies  $0 < \gamma < 1$ .

(iii) [true or false] Policies found by value iteration are superior to policies found by policy iteration.

(iv) [true or false] If an MDP has a transition model  $T$  that assigns non-zero probability for all triples  $T(s, a, s_0)$  then Q-learning will fail.

**Q5. What is the significance of Pooling layers?**

1. It helps in dimensionality reduction.
2. It is invariant to transformations of rotation and translation.
3. It helps in regularization
4. None of the above