

# Key concepts on Deep Neural Networks

Quiz, 10 questions

10/10 points (100%)

✓ **Congratulations! You passed!**

Next Item



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points

1.

What is the "cache" used for in our implementation of forward propagation and backward propagation?

- ☐ It is used to keep track of the hyperparameters that we are searching over, to speed up computation.
- ☐ It is used to cache the intermediate values of the cost function during training.
- ☒ We use it to pass variables computed during forward propagation to the corresponding backward propagation step. It contains useful values for backward propagation to compute derivatives.



**Correct**

Correct, the "cache" records values from the forward propagation units and sends it to the backward propagation units because it is needed to compute the chain rule derivatives.

- ☐ We use it to pass variables computed during backward propagation to the corresponding forward propagation step. It contains useful values for forward propagation to compute activations.



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2.

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Among the following, which ones are "hyperparameters"? (Check all that apply.)

10/10 points (100%)

☐ bias vectors  $b^{[l]}$



Un-selected is correct

☒ number of iterations



Correct

☐ activation values  $a^{[l]}$



Un-selected is correct

☒ number of layers  $L$  in the neural network



Correct

☒ size of the hidden layers  $n^{[l]}$



Correct

☒ learning rate  $\alpha$



Correct

☐ weight matrices  $W^{[l]}$



Un-selected is correct



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3.

Which of the following statements is true?

- ☒ The deeper layers of a neural network are typically computing more complex features of the input than the earlier layers.



Correct

- ☐ The earlier layers of a neural network are typically computing more complex features of the input than the deeper layers.



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points

4.

Vectorization allows you to compute forward propagation in an  $L$ -layer neural network without an explicit for-loop (or any other explicit iterative loop) over the layers  $l=1, 2, \dots, L$ . True/False?

- ☐ True
- ☒ False



Correct

Forward propagation propagates the input through the layers, although for shallow networks we may just write all the lines ( $a^{[2]} = g^{[2]}(z^{[2]})$ ,  $z^{[2]} = W^{[2]}a^{[1]} + b^{[2]}$ , ...) in a deeper network, we cannot avoid a for loop iterating over the layers: ( $a^{[l]} = g^{[l]}(z^{[l]})$ ,  $z^{[l]} = W^{[l]}a^{[l-1]} + b^{[l]}$ , ...).



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points

5.

Assume we store the values for `layer_dims` in an array called `layers`, as follows:  
`layer_dims = [784, 4, 3, 2, 1]`. So layer 1 has four hidden units, layer 2 has 3 hidden units and so on. Which of the following for-loops will allow you to initialize the parameters for the model?

10/10 points (100%)

- ☐

```
1 for(i in range(1, len(layer_dims)/2)):
2     parameter['W' + str(i)] = np.random.randn(layers[i], layers[i-1])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
```
- ☐

```
1 for(i in range(1, len(layer_dims)/2)):
2     parameter['W' + str(i)] = np.random.randn(layers[i], layers[i-1])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i-1], 1) * 0.01
```
- ☐

```
1 for(i in range(1, len(layer_dims))):
2     parameter['W' + str(i)] = np.random.randn(layers[i-1], layers[i])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
```
- ☒

```
1 for(i in range(1, len(layer_dims))):
2     parameter['W' + str(i)] = np.random.randn(layers[i], layers[i-1])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
```



Correct



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points

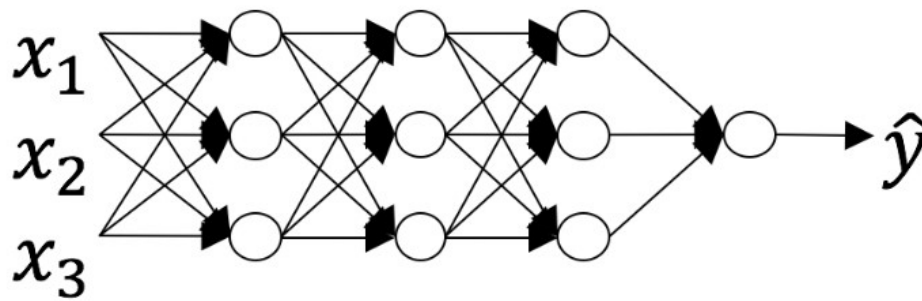
6.

Consider the following neural network.

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How many layers does this network have?

☒ The number of layers  $L$  is 4. The number of hidden layers is 3.

**Correct**

Yes. As seen in lecture, the number of layers is counted as the number of hidden layers + 1. The input and output layers are not counted as hidden layers.

☐ The number of layers  $L$  is 3. The number of hidden layers is 3.

☐ The number of layers  $L$  is 4. The number of hidden layers is 4.

☐ The number of layers  $L$  is 5. The number of hidden layers is 4.



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points

7.

During forward propagation, in the forward function for a layer  $l$  you need to know what is the activation function in a layer (Sigmoid, tanh, ReLU, etc.). During backpropagation, the corresponding backward function also needs to know what is the activation function for layer  $l$ , since the gradient depends on it.

True/False?

☒ True

**Correct**

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Yes, as you've seen in the week 3 each activation has a different derivative. Thus, during backpropagation you need to know which activation was used in the forward propagation to be able to compute the correct derivative.

10/10 points (100%)

☐ False

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points

8.

There are certain functions with the following properties:

(i) To compute the function using a shallow network circuit, you will need a large network (where we measure size by the number of logic gates in the network), but (ii) To compute it using a deep network circuit, you need only an exponentially smaller network. True/False?



True



**Correct**



False

---



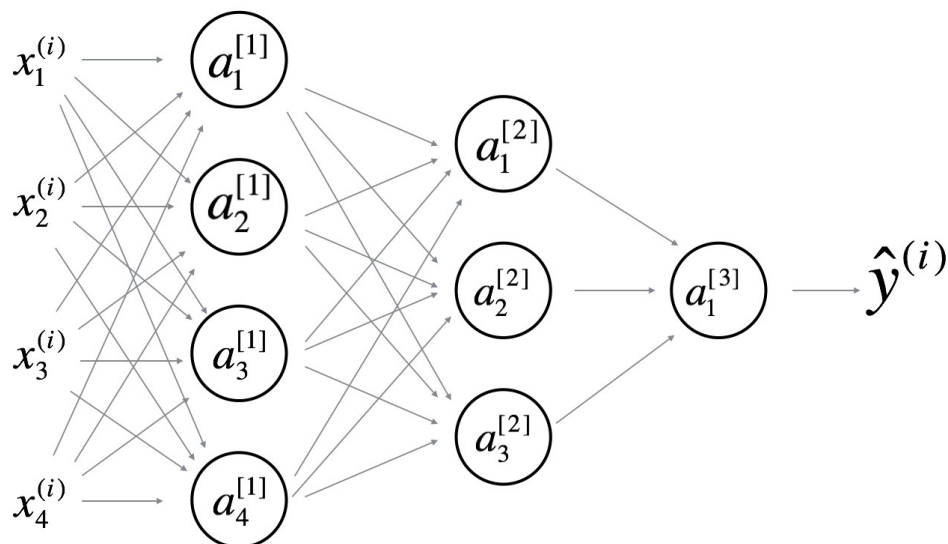
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9.

# Key concepts on Deep Neural Networks

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Which of the following statements are True? (Check all that apply).

☒  $W^{[1]}$  will have shape (4, 4)

**Correct**

Yes. More generally, the shape of  $W^{[l]}$  is  $(n^{[l]}, n^{[l-1]})$ .

☒  $b^{[1]}$  will have shape (4, 1)

**Correct**

Yes. More generally, the shape of  $b^{[l]}$  is  $(n^{[l]}, 1)$ .

☐  $W^{[1]}$  will have shape (3, 4)

**Un-selected is correct**

☐  $b^{[1]}$  will have shape (3, 1)

**Un-selected is correct**

☒  $W^{[2]}$  will have shape (3, 4)

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☐  $b^{[2]}$  will have shape (1, 1)



Un-selected is correct

☐  $W^{[2]}$  will have shape (3, 1)



Un-selected is correct

☒  $b^{[2]}$  will have shape (3, 1)



Correct

Yes. More generally, the shape of  $b^{[l]}$  is  $(n^{[l]}, 1)$ .

☐  $W^{[3]}$  will have shape (3, 1)



Un-selected is correct

☒  $b^{[3]}$  will have shape (1, 1)



Correct

Yes. More generally, the shape of  $b^{[l]}$  is  $(n^{[l]}, 1)$ .

☒  $W^{[3]}$  will have shape (1, 3)



Correct

Yes. More generally, the shape of  $W^{[l]}$  is  $(n^{[l]}, n^{[l-1]})$ .

☐  $b^{[3]}$  will have shape (3, 1)



Un-selected is correct





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points

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10.

Whereas the previous question used a specific network, in the general case what is the dimension of  $W^{[l]}$ , the weight matrix associated with layer  $l$ ?

☐  $W^{[l]}$  has shape  $(n^{[l]}, n^{[l+1]})$

☐  $W^{[l]}$  has shape  $(n^{[l+1]}, n^{[l]})$

☒  $W^{[l]}$  has shape  $(n^{[l]}, n^{[l-1]})$



**Correct**

True

☐  $W^{[l]}$  has shape  $(n^{[l-1]}, n^{[l]})$

