

# Key concepts on Deep Neural Networks

Quiz, 10 questions

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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.
  - ☒ 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.
  - ☐ It is used to cache the intermediate values of the cost function during training.
  - ☐ 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.

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

- ☒ number of layers  $L$  in the neural network
  - ☐ activation values  $a^{[l]}$
  - ☒ size of the hidden layers  $n^{[l]}$
  - ☐ weight matrices  $W^{[l]}$
  - ☒ learning rate  $\alpha$
  - ☒ number of iterations
  - ☐ bias vectors  $b^{[l]}$
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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.

☐

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

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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

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5.

Assume we store the values for  $n^{[l]}$  in an array called layers, as follows: layer\_dims = [ $n_x$ , 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?

☐

```
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
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☐

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☐

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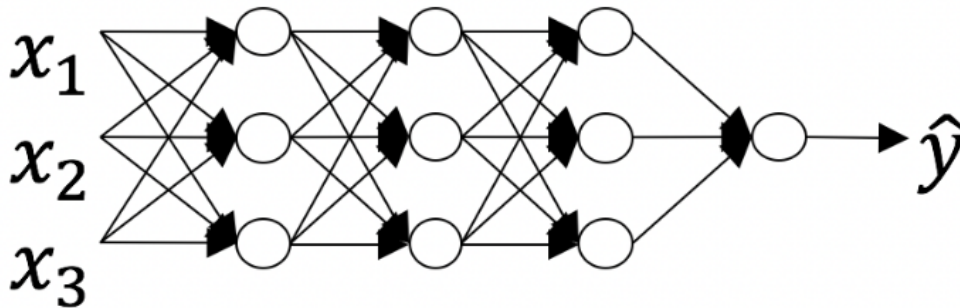
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6.

Consider the following neural network.



How many layers does this network have?



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



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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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



False

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8.

There are certain functions with the following properties:

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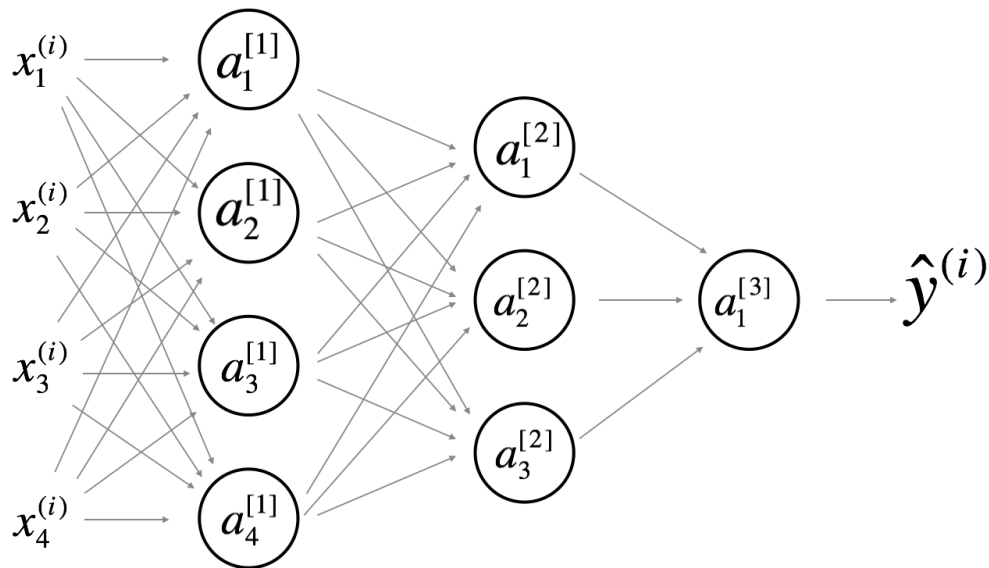
(i) To compute the function using a shallow network circuit, you will need a large network (where we measure size by the number of logic gates in the network), but (ii) To compute it using a deep network circuit, you need only an exponentially smaller network. True/False?

- ☐ True
- ☐ False

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9.

Consider the following 2 hidden layer neural network:



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

- ☐  $W^{[1]}$  will have shape (4, 4)
- ☐  $b^{[1]}$  will have shape (4, 1)
- ☐  $W^{[1]}$  will have shape (3, 4)
- ☐  $b^{[1]}$  will have shape (3, 1)
- ☐  $W^{[2]}$  will have shape (3, 4)
- ☐  $b^{[2]}$  will have shape (1, 1)
- ☐  $W^{[2]}$  will have shape (3, 1)
- ☐  $b^{[2]}$  will have shape (3, 1)

☐ $W^{[3]}$  will have shape (3, 1)

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☐ $b^{[3]}$  will have shape (1, 1)

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☐ $W^{[3]}$  will have shape (1, 3)☐ $b^{[3]}$  will have shape (3, 1)

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

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