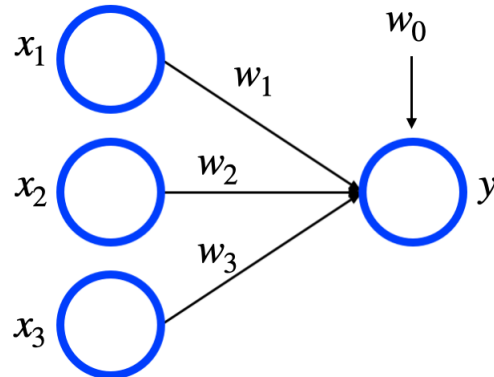


Question 1

Consider the neural network below, where we set $w_0 = -5$, $w_1 = 2$, $w_2 = -1$, and $w_3 = 3$. x_1 , x_2 , and x_3 represent input neurons, and y represents the output neuron.



- a) Using a step activation function, what value will this network compute for y given inputs $x_1 = 1$, $x_2 = 5$, and $x_3 = 2$?
- b) Using a ReLU activation function, what value will this network compute for y given inputs $x_1 = 1$, $x_2 = 5$, and $x_3 = 2$?
- c) Using a step activation function, what value will this network compute for y given inputs $x_1 = 3$, $x_2 = 2$, and $x_3 = 4$?
- d) Using a ReLU activation function, what value will this network compute for y given inputs $x_1 = 3$, $x_2 = 2$, and $x_3 = 4$?

Answers

- a) TODO
- b) TODO
- c) TODO
- d) TODO

Question 2

- a) What problem does dropout solve when training neural networks?
- b) What problem do hidden layers solve in a neural network?
- c) What problem does backpropagation solve when working with neural networks?

Answers

- a) TODO
- b) TODO
- c) TODO

Question 3

- a) How many total weights (including biases) will there be for a fully connected neural network with a single input layer with 4 units and a single output layer with 3 units? How do you know?
- b) How many total weights (including biases) will there be for a fully connected neural network with a single input layer with 3 units, a single hidden layer with 5 units, and a single output layer with 4 units? How do you know?

Answers

- a) TODO
- b) TODO

Question 4

Consider a 4x4 grayscale image with the following pixel values.

2	4	6	8
16	14	12	10
18	20	22	24
32	30	28	26

- a) What would be the result of applying the following convolutional matrix to the original image? Your result should take the form of a 2x2 matrix, so your answer should include all 4 of the resulting values.

0	-1	0
-1	5	-1
0	-1	0

- b) What would be the result of applying a 2x2 max-pool to the original image? Your result should take the form of a 2x2 matrix, so your answer should include all 4 of the resulting values.

Answers

a)

TODO	TODO
TODO	TODO

b)

TODO	TODO
TODO	TODO