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NPTEL (<https://swayam.gov.in/explorer?ncCode=NPTEL>) » Deep Learning - IIT Ropar (course)

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Course
outline

About
NPTEL ()

How does an
NPTEL
online
course
work? ()

Week 0 ()

Week 1 ()

Week 2 ()

● Linearly
Separable
Boolean
Functions

Week 2 : Assignment 2

The due date for submitting this assignment has passed.

Due on 2025-02-05, 23:59 IST.

Assignment submitted on 2025-01-31, 16:28 IST

1) Which of the following statements is(are) true about the following function? **1 point**

$$\sigma(z) = \frac{1}{1+e^{-(z)}}$$

- ☒ The function is monotonic
- ☒ The function is continuously differentiable
- ☒ The function is bounded between 0 and 1
- ☒ The function attains its maximum when $z \rightarrow \infty$

Yes, the answer is correct.

Score: 1

Accepted Answers:

The function is monotonic

The function is continuously differentiable

The function is bounded between 0 and 1

The function attains its maximum when $z \rightarrow \infty$

2) How many weights does a neural network have if it consists of an input layer with 2 neurons, two hidden layers each with 5 neurons, and an output layer with 2 neurons? Assume there are no bias terms in the network.

Yes, the answer is correct.

Score: 1

Accepted Answers:

(Type: String) 45

1 point

(unit?
unit=36&less
n=37)

● Representation Power of a Network of Perceptrons (unit?
unit=36&less
n=38)

● Sigmoid Neuron (unit?
unit=36&less
n=39)

● A typical Supervised Machine Learning Setup (unit?
unit=36&less
n=40)

● Learning Parameters: (Infeasible) guess work (unit?
unit=36&less
n=41)

● Learning Parameters: Gradient Descent (unit?
unit=36&less
n=42)

● Representation Power of Multilayer Network of Sigmoid Neurons (unit?
unit=36&less
n=43)

● Lecture Material for Week 2 (unit?
unit=36&less
n=44)

○ Week 2 Feedback Form: Deep Learning - IIT Ropar!! (unit?

3) A function $f(x)$ is approximated using 100 tower functions. What is the minimum number of neurons required to construct the network that approximates the function?

1 point

- ☐ 99
☐ 100
☐ 101
☒ 200
☐ 201
☐ 251

No, the answer is incorrect.
Score: 0

Accepted Answers:
201

4) Suppose we have a Multi-layer Perceptron with an input layer, one hidden layer and an output layer. The hidden layer contains 32 perceptrons. The output layer contains one perceptron. Choose the statement(s) that are true about the network.

1 point

- ☐ Each perceptron in the hidden layer can take in only 32 Boolean inputs
☐ Each perceptron in the hidden layer can take in only 5 Boolean inputs
☐ The network is capable of implementing 2^5 Boolean functions
☒ The network is capable of implementing 2^{32}

Yes, the answer is correct.
Score: 1

Accepted Answers:
The network is capable of implementing 2^{32}

5) Consider a function $f(x) = x^3 - 5x^2 + 5$ What is the updated value of x after 2nd iteration of the gradient descent update, if the learning rate is 0.1 and the initial value of x is 5?

1.9

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 3.1,3.2

1 point

6) Consider the sigmoid function $\frac{1}{1+e^{-(wx+b)}}$, where w is a positive value. Select all the correct statements regarding this function.

1 point

- ☒ Increasing the value of b shifts the sigmoid function to the right (i.e., towards positive infinity)
☐ Increasing the value of b shifts the sigmoid function to the left (i.e., towards negative infinity)
☐ Increasing the value of w decreases the slope of the sigmoid function
☒ Increasing the value of w increases the slope of the sigmoid function

No, the answer is incorrect.

unit=36&lesson=185)

● **Quiz: Week 2 : Assignment 2**
(assessment?name=304)

● Week 2 :
Solution (unit=36&lesson=310)

Week 3 ()

week 4 ()

Week 5 ()

Week 6 ()

Week 7 ()

Week 8 ()

Week 9 ()

week 10 ()

Week 11 ()

Week 12 ()

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Score: 0

Accepted Answers:

Increasing the value of b shifts the sigmoid function to the left (i.e., towards negative infinity)

Increasing the value of w increases the slope of the sigmoid function

7) You are training a model using the gradient descent algorithm and notice that the loss decreases and then increases after each successive epoch (pass through the data). Which of the following techniques would you employ to enhance the likelihood of the gradient descent algorithm converging? (Here, η refers to the step size.) **1 point**

☐

Set $\eta = 1$

☐

Set $\eta = 0$

☒

Decrease the value of η

☐

Increase the value of η

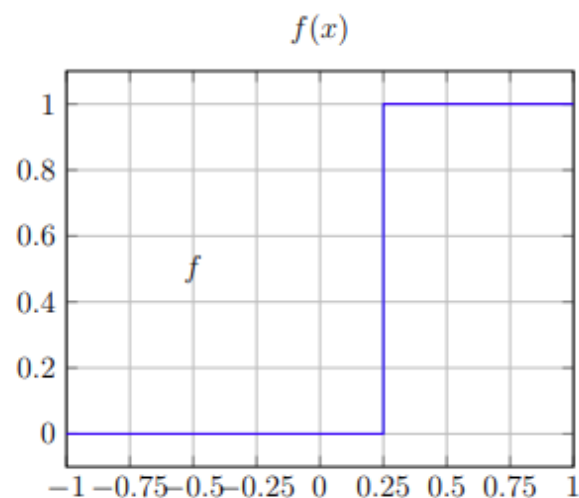
Yes, the answer is correct.

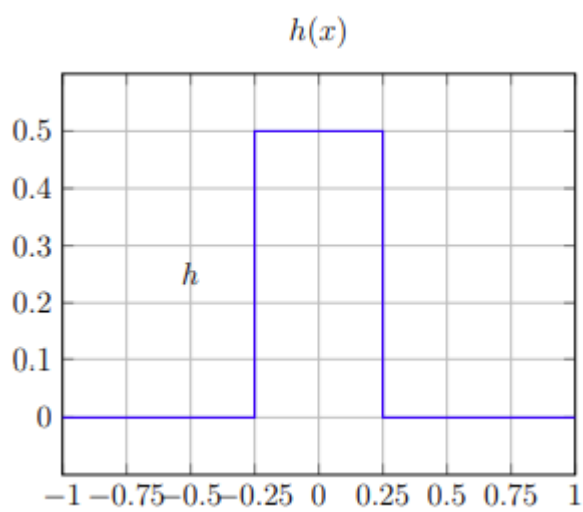
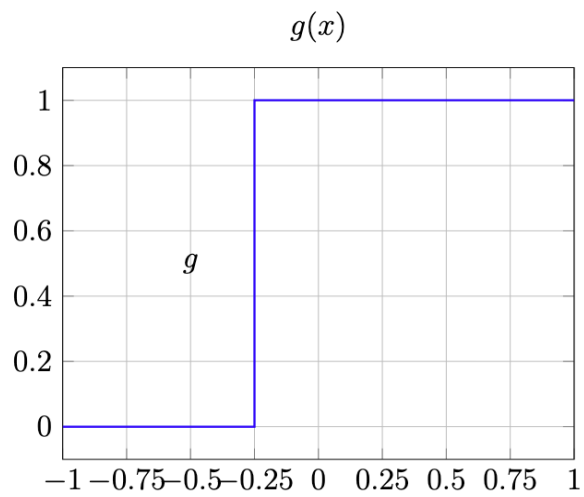
Score: 1

Accepted Answers:

Decrease the value of η

8) The diagram below shows three functions f , g and h . The function h is obtained by combining the functions f and g . Choose the right combination that generated h . **1 point**





- ☐ $h = f - g$
☐ $h = 0.5 * (f + g)$
☐ $h = 0.5 * (f - g)$
☒ $h = 0.5 * (g - f)$

Yes, the answer is correct.

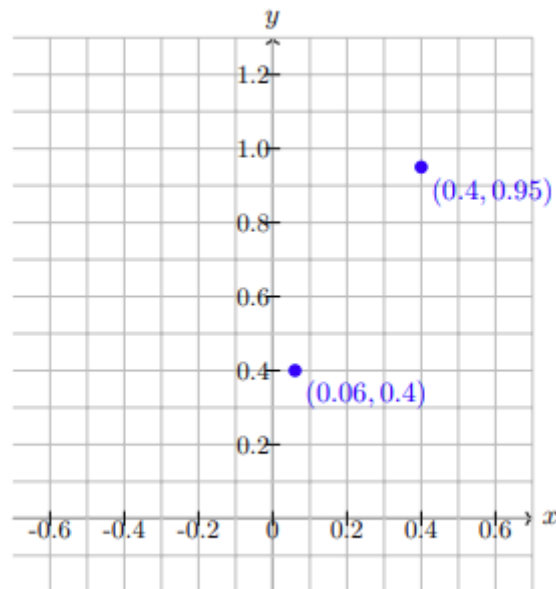
Score: 1

Accepted Answers:

$$h = 0.5 * (g - f)$$

9) Consider the data points as shown in the figure below,

1 point



Suppose that the sigmoid function given below is used to fit these data points.

$$\frac{1}{1+e^{-(20x+1)}}$$

Compute the Mean Square Error (MSE) loss $L(w, b)$

- ☒ 0
☐ 0.126
☐ 1.23
☐ 1

No, the answer is incorrect.

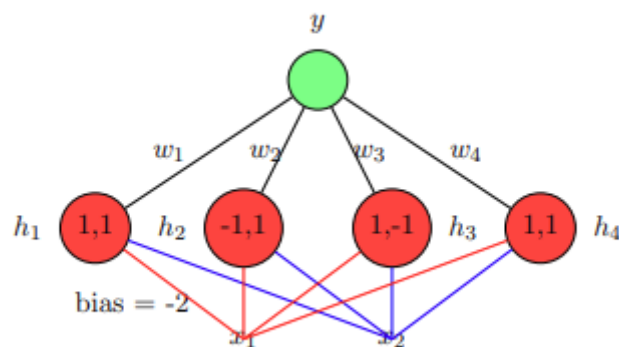
Score: 0

Accepted Answers:

0.126

10) Suppose that we implement the XOR Boolean function using the network shown below. Consider the statement that “A hidden layer with two neurons is suffice to implement XOR”. The statement is **1 point**

☒ $w = -1$ (red edge)
☒ $w = +1$ (blue edge)



☐ True

☒ False

No, the answer is incorrect.
Score: 0

Accepted Answers:

True