Final Exam

Final Exam Instructions

1. Time allowed: **1 hour**

2. Attempts per question:

- One attempt - For True/False questions
- Two attempts - For any question other than True/False

IMPORTANT: Do not let the time run out and expect the system to grade you automatically. You must explicitly submit your answers, otherwise they would be marked as incomplete.

Question 1

1/1 point (graded)

Which of the following are applications of Deep Learning?

- ○ Iterating Photos to Create New Objects
- ○ Object Detection in Images
- ○ Restoring Sounds in videos
- ○ Speech Enactment
- ◉ All of the Above ✔

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✔ Correct (1/1 point)

Question 2

1/1 point (graded)

An output layer can only have 1 neuron.

- ○ True
- ◉ False ✔

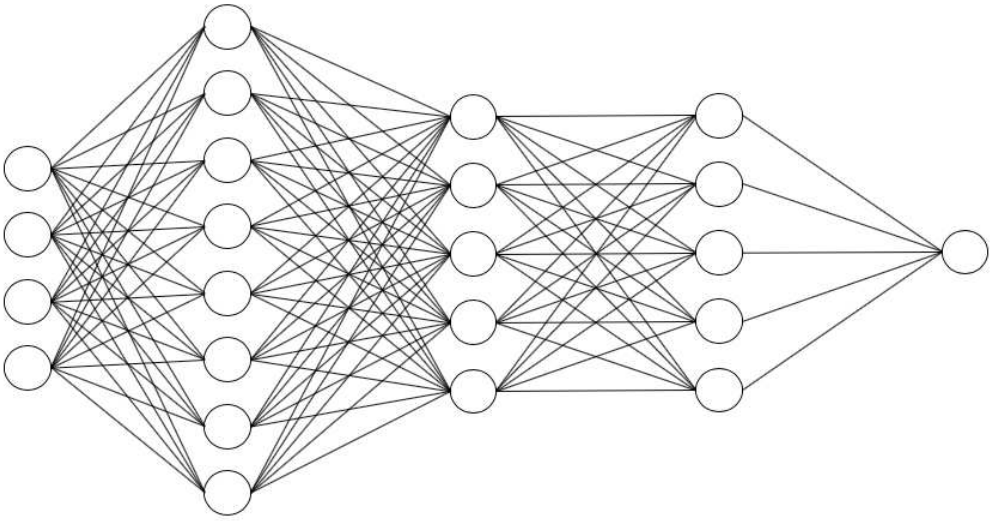
Submit You have used 1 of 1 attempt

✔ Correct (1/1 point)

Question 3

1/1 point (graded)

How many hidden layers does the following neural network have?



- 1
- 2
- The network does not have any hidden layers

Submit You have used 2 of 2 attempts

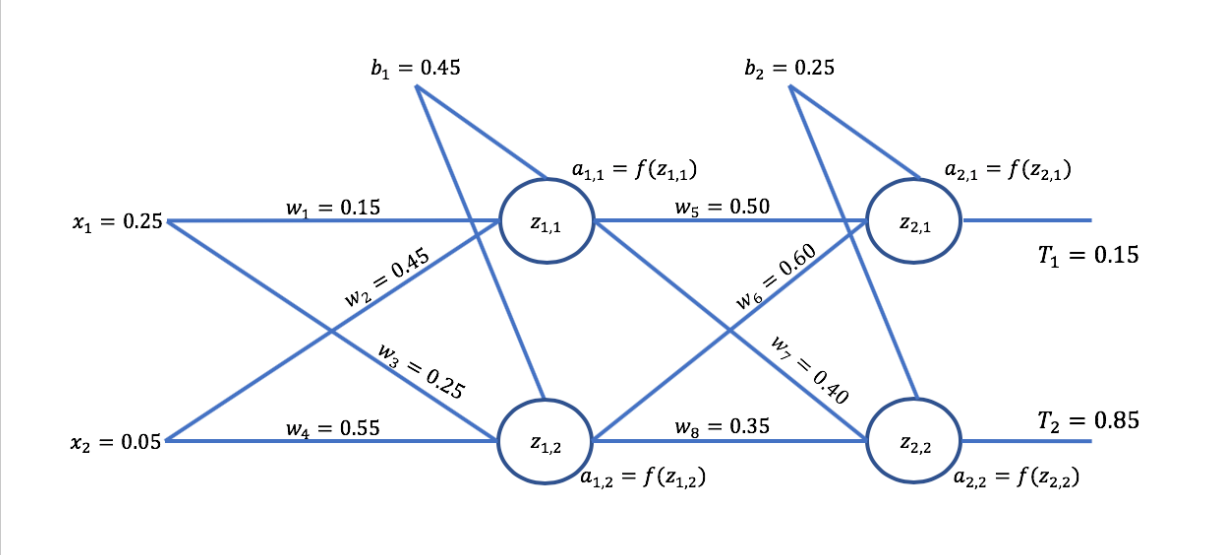
✔ Correct (1/1 point)

Question 4

1/1 point (graded)

Use the following neural network for **Questions 1- 7**.

The following is a neural network, that takes an input vector of size 2, has a hidden layer of two neurons, and has an output layer of two neurons too.



The neural network uses the **sigmoid function** as an activation function for **ALL** the neurons.

0.51

Submit You have used 2 of 2 attempts

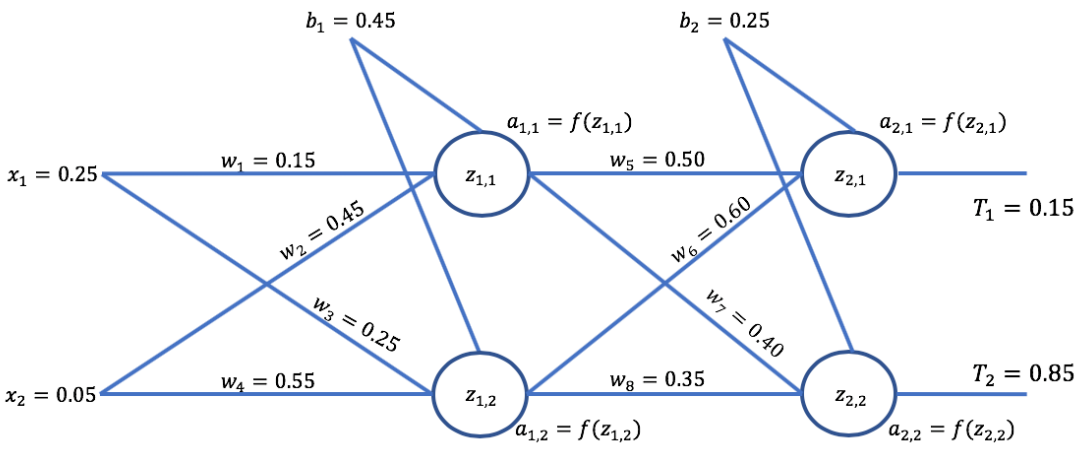
✔ Correct (1/1 point)

Question 5

1/1 point (graded)

Using the same network in Question 3, what is the value of $a_{1,2}$?

Here is the network again for your convenience:



0.63 ✔

0.63

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✔ Correct (1/1 point)

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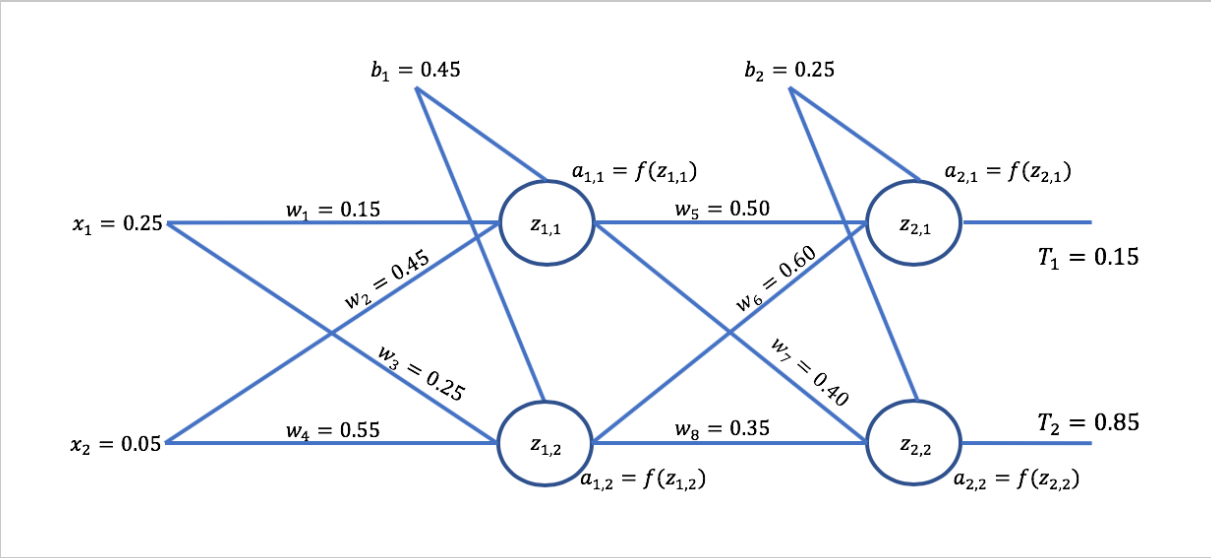
Here is the network again for your convenience:



0.72 ✔

0.72

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 7

1/1 point (graded)

Using the same network in Question 3, what is the value of $a_{2,2}$?

Here is the network again for your convenience:

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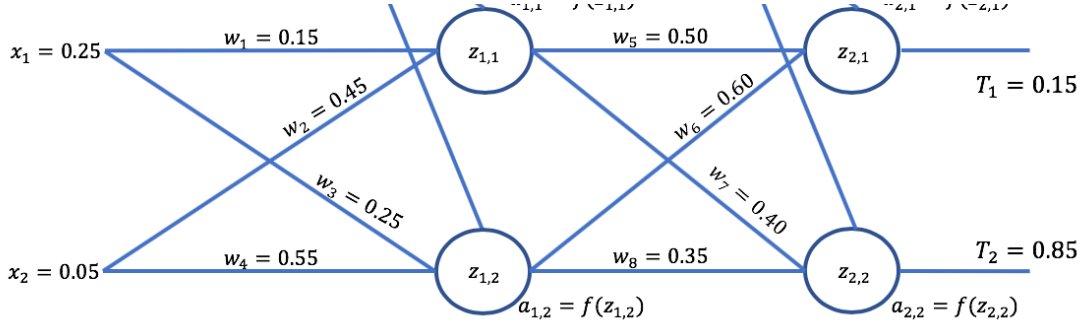

0.67 ✔

0.67

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 8

1/1 point (graded)

Using the same network in Question 3, what is the total error between the predicted values and the ground Truth values?

Here is the network again for your convenience:

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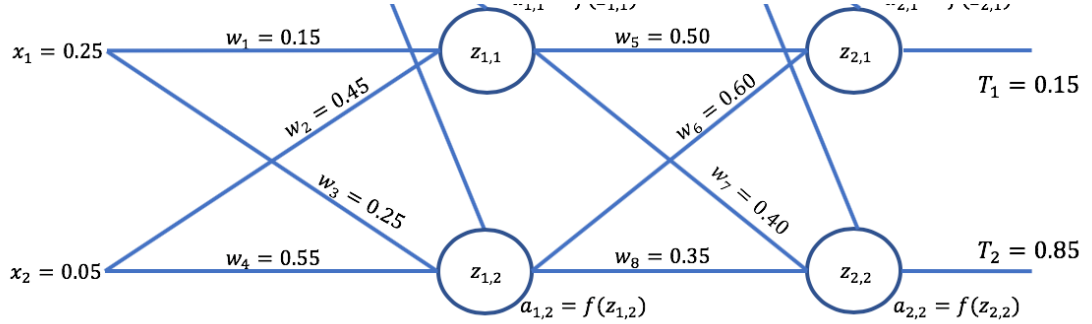

Hint: You can use the following expression to calculate the total error:

$$E_T = \frac{1}{2}\sum_{i=1}(T_i - a_{2,i})^2$$

0.18 ✔

0.18

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 9

1/1 point (graded)

Using the same network in Question 3, what is the value of $\frac{\partial E_T}{\partial w_5}$?

Here is the network again for your convenience:

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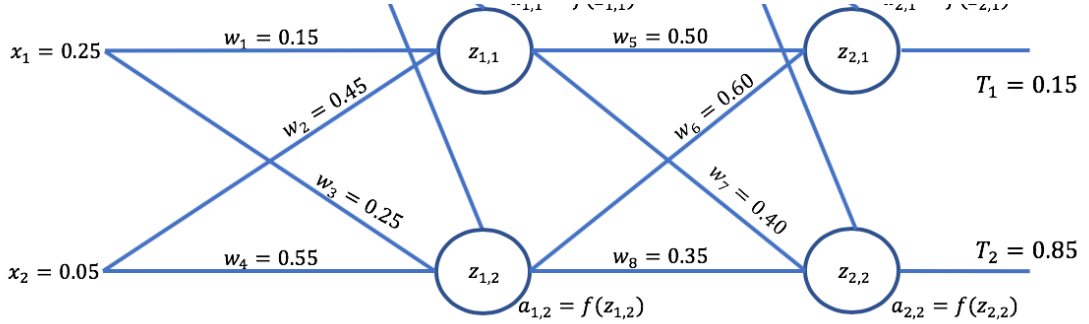

0.07 ✔

0.07

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 10

1/1 point (graded)

Using the same network in Question 3, what is the value of $\frac{\partial E_T}{\partial w_8}$?

Here is the network again for your convenience:

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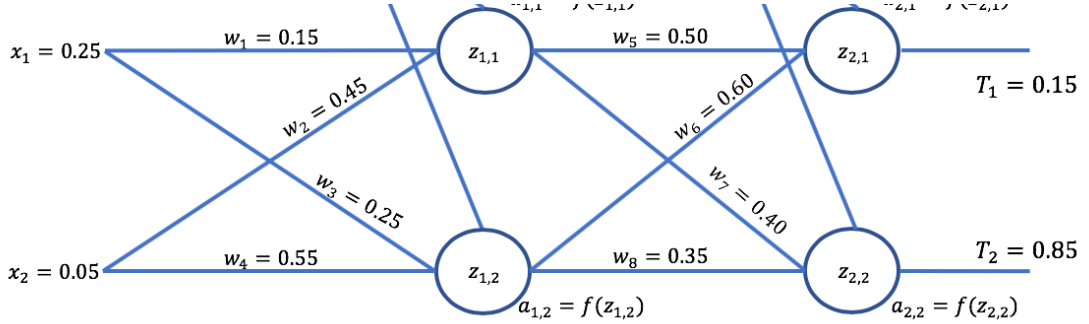

-0.025 ✔

-0.025

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 11

1/1 point (graded)

Vanishing gradient is a problem that occurs in the later layers of a network mainly when using the sigmoid function as the activation function in the hidden layers.

- ○ True
- ◉ False ✔

Submit You have used 1 of 1 attempt

✔ Correct (1/1 point)

- [ ] It is a type of a linear function and is very handy when building a network for a regression problem
- [ ] It turns very large positive numbers to 1 and very large negative numbers to 0
- [x] It is a type of a sigmoid function
- [ ] It is as good as the ReLU function and can be safely used in hidden layers
- [x] It is very handy when building a network for a classification problem

✔

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 13

1/1 point (graded)

Keras is a high level API for building deep learning models. It provides limited control over the different nodes and layers in a network. If you are seeking more control over a network, then TensorFlow is the right library.

- (•) True ✔
- ( ) False

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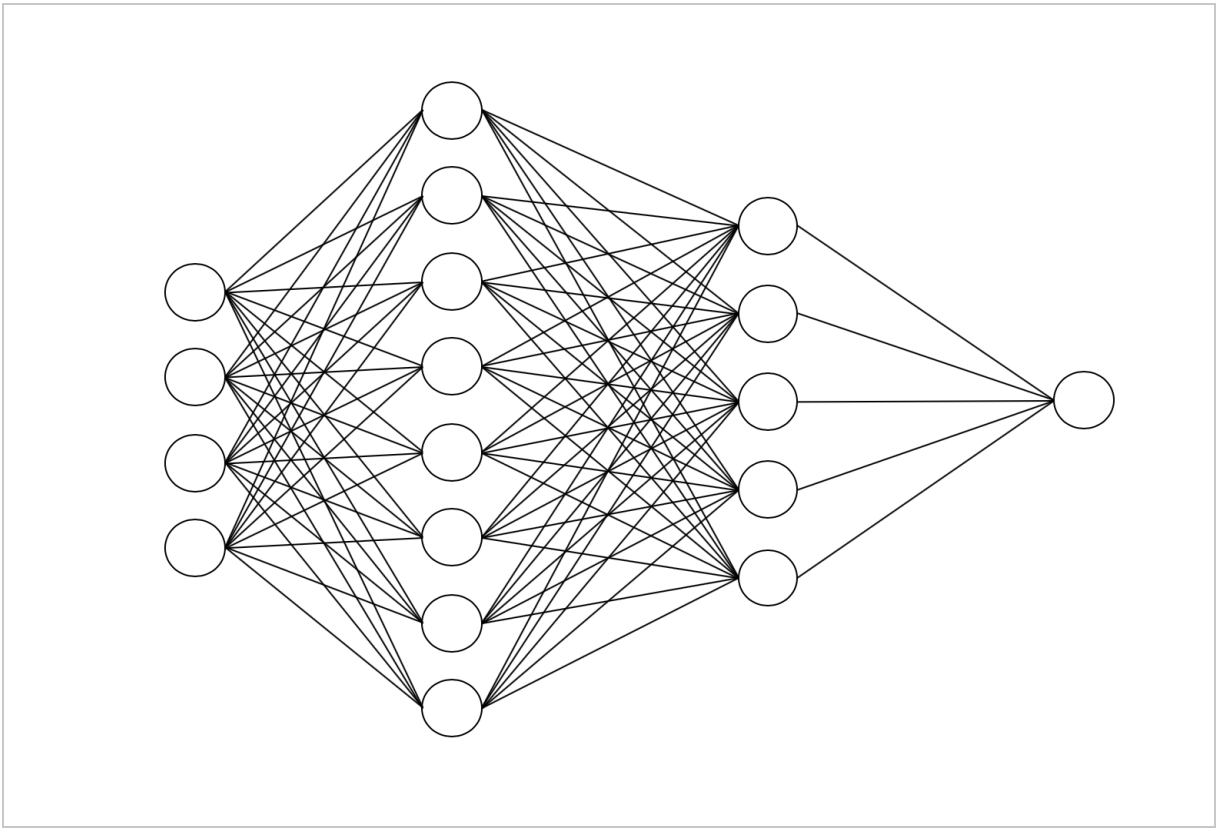
Which of the following codes create the followig neural network using the Keras library?



model.add_Dense(8, activation= relu))

model.add_Dense(1))

- model = Sequential()
  model.add(Dense(8, activation='relu', input_shape=(4,)))

  model.add(Dense(5, activation='relu'))

  model.add(Dense(1))

  ✔

- model = Sequential()
  model.Dense(add(8, activation='relu', input_shape=(4,)))

  model.Dense(add(5, activation='relu'))

  model.Dense(add(1))

- model = Sequential()
  model.Dense(add(8, activation='relu', input_shape=(8,)))

  model.Dense(add(5, activation='relu'))

  model.Dense(add(1))

- model = Sequential()
  model.add(Dense(8, activation='relu', input_shape=(8,)))

  model.add(Dense(5, activation='relu'))

  model.add(Dense(1))

✔ Correct (1/1 point)

Question 15

1/1 point (graded)

For supervised learning, which of the following deep neural networks would you choose? Select all that apply

- ☐ Autoencoders
- ☑ Convolutional Neural Netwroks
- ☐ Restricted Boltzmann Machines
- ☑ Recurrent Neural Networks
- ☑ Long Short Term Memory Networks

✔

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 16

1/1 point (graded)

Which of these lines of code add the following to a convolutional neural network?

1. a convolutional layer with 16 filters of size 3, 5 that scan the input images with a stride of magnitude 1 in the horizontal direction and of magnitude 2 in the vertical direction, and uses the relu function as the activation function

2. a pooling layer that performs max pooling with a pool size of 2 by 1

- model.add(Conv(16, kernel_size=(3, 5), strides=(1, 2), activation='relu'))
  model.add(MaxPooling(pool_size=(2, 2))

- model.add(Conv2D(16, kernel_size=(3, 5), strides=(1, 2), activation='relu'))
  model.add(MaxPooling2D(pool_size=(2, 1))

- model.add(Conv2D(16, kernel_size=(5, 3), strides=(2, 1), activation='relu'))
  model.add(MaxPooling2D(pool_size=(2, 2))

- model.add(Conv2D(16, kernel_size=(5, 3), stride_size=(2, 1), function='relu'))
  model.add(MaxPooling2D(pool=(2, 1))

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 17

1/1 point (graded)

- [ ] A convolutional neural network is an unsupervised neural network model that uses backpropagation by setting the target variable to be the same as the input
- [x] A convolutional neural network consists of a series of convolutional, ReLU, and pooling layers, as well as a number of fully connected layers
- [ ] Convolutional neural networks cannot take images as input
- [ ] Just like conventional neural networks, a convolutional neural network takes (n x 1) vectors as input
- [x] Convolutional neural networks are best for solving problems related to image recognition, object detection, and other computer vision applications

✔

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✔ Correct (1/1 point)

Question 18

1/1 point (graded)

In a convolutional neural network, the pooling layer's main objective is to flatten the image data before passing it on to the next convolutional layer.

- ○ True
- ◉ False ✔

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Recurrent Neural Networks are networks with loops, that don't just take a new input at a time, but also take as input the outputs from previous and future data points.

- True
- False ✔

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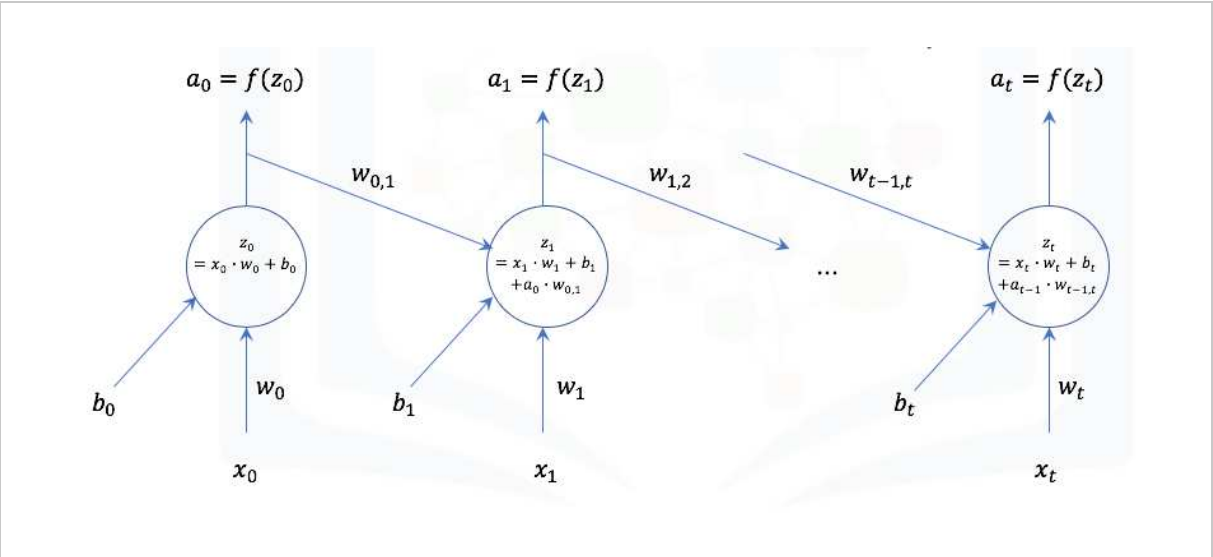
✔ Correct (1/1 point)

Question 20

1/1 point (graded)



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- Convolutional Neural Networks
- Recurrent Neural Networks ✔
- Autoencoders
- None of the above

Submit You have used 2 of 2 attempts

✔ Correct (1/1 point)

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