1. Answer the questions following perceptron learning:

0.4

0.2

0.7

Input

Neurons

Output

Neuron

Weights

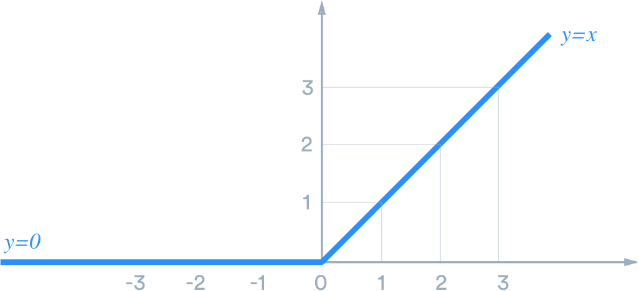
0.1

Bias

1

0

1

* 1. The input of the output neuron is:
  2. If the transfer function of output neuron is ReLU, what is the output of output neuron?   
     
     1. The output of the output neuron, when using ReLU is 1.2, since   
         (By the way, I’ve never seen the max(0,x) form of this function before this class. It looks like a programming function call, not a mathematical function. This should have been explained in class.)
  3. If the desired output is 0 and the updating formula is given by   
     *wnew = wold +* α ×*(desired - output)* × *input*
     1. In NN’s terminology, what is α called?
        1. Alpha (α) is the learning rate or smoothing function.
     2. Suppose α=1, please update all weights.
  4. What is the output after you adjust all *w* for this round?  
     The value -1.2 in the ReLU function results in y=0.

1. Please download default\_credit.csv from BeachBoard, try to build:
   1. A decision tree classifier – HW4
   2. A random forest classifier – HW6
   3. A neuron network classifier – HW7, Pg 293

Requirements for Question 2:

* + - 1. Use 30% of the data as testing data
      2. Display the accuracy score of both training and testing data
      3. Please try to achieve at least >80% for the Neural Network

This data description is in <https://archive.ics.uci.edu/ml/datasets/default+of+credit+card+clients>

Note, in this dataset, the last column (Y ) is the class.

Hint: you better scale the input data before feeding to classifiers, like this:

from sklearn.preprocessing import MinMaxScaler

df = pd.read\_csv('default\_credit.csv')

X\_df = df.drop(columns=['Y'])

y = df['Y']

scaleInput = MinMaxScaler()

X = scaleInput.fit\_transform(X\_df)