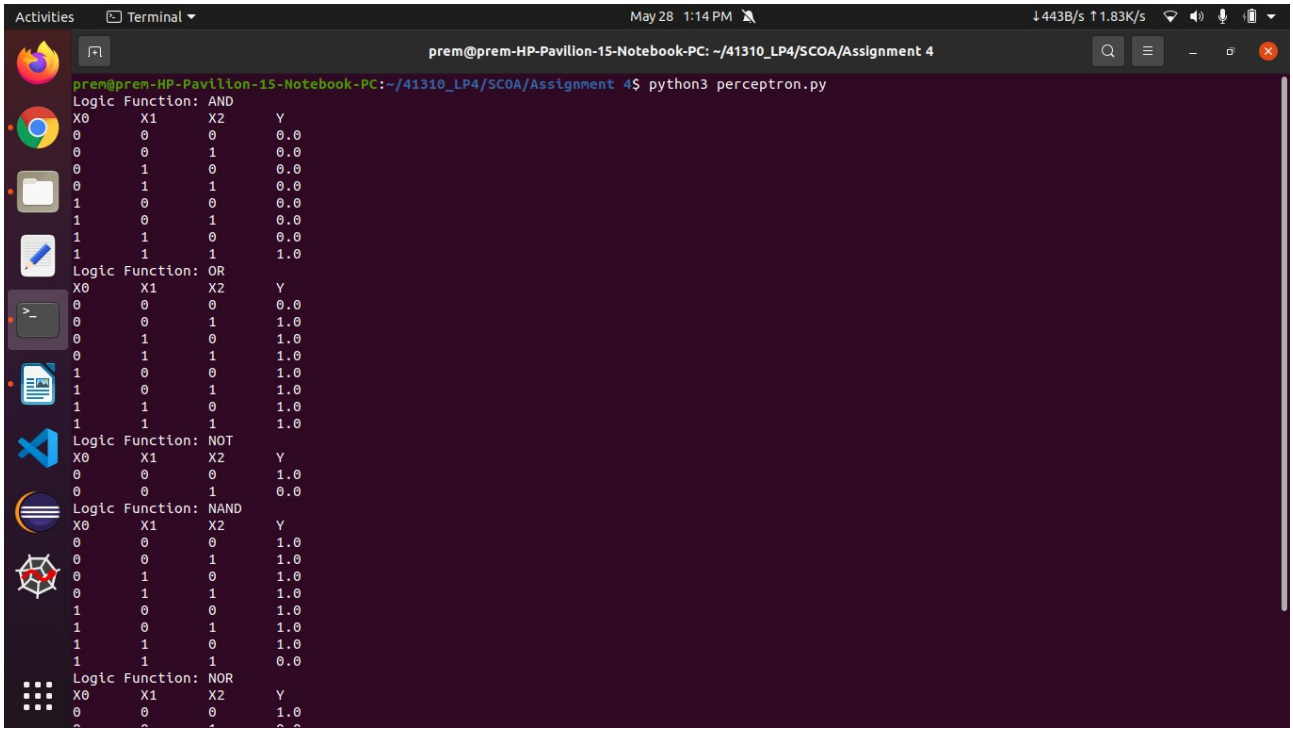
Roll no: 41310
Name: Prem Vinod Bansod
Assignment: 4(SCOA)

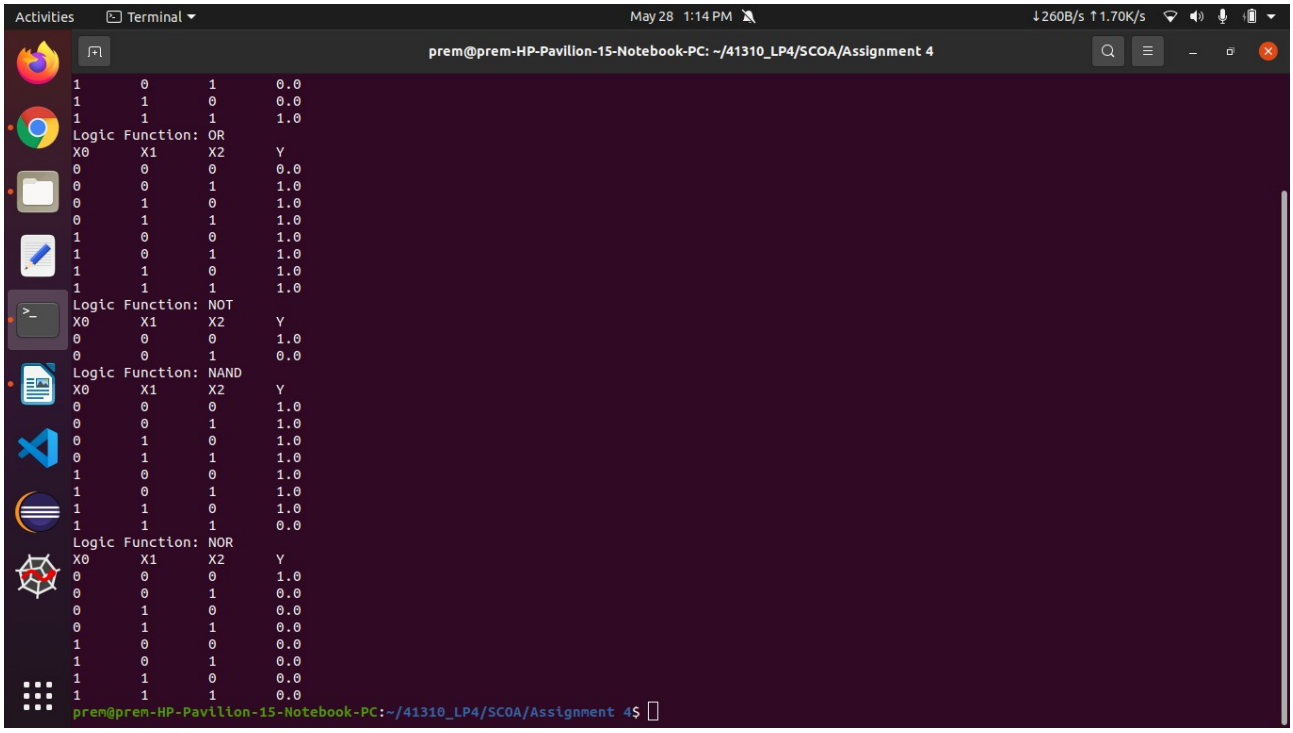
code:

```
import numpy as np


def perceptron(weights, inputs, bias):

    model = np.add(np.dot(inputs, weights), bias)
    logit = activation_function(model, type="sigmoid")
    return np.round(logit)


def activation_function(model, type="sigmoid"):

    return {
        "sigmoid": 1 / (1 + np.exp(-model))
    }[type]


def compute(data, logic_gate, weights, bias):
    weights = np.array(weights)
    output = np.array([ perceptron(weights, datum, bias) for datum in data ])

    return output


# This function is taken from https://github.com/fjcamillo/Neural-Representation-of-Logic-Functions/blob/master/Logic.py
def print_template(dataset, name, data):
    # act = name[6:]
    print("Logic Function: {}".format(name.upper()))
    print("X0\tX1\tX2\tY")
    toPrint = ["{1}\t{2}\t{3}\t{0}".format(output, *datas) for datas, output in zip(dataset, data)]
    for i in toPrint:
        print(i)


def main():
    dataset = np.array([
      [0, 0, 0],
      [0, 0, 1],
      [0, 1, 0],
      [0, 1, 1],
      [1, 0, 0],
      [1, 0, 1],
      [1, 1, 0],
      [1, 1, 1]
    ])
```

```
    gates = {
        "and": compute(dataset, "and", [1, 1, 1], -2),
        "or": compute(dataset, "or", [1, 1, 1], -0.9),
        "not": compute(np.array([ [0], [1] ]), "not", [-1], 1),
        "nand": compute(dataset, "nand", [-1, -1, -1], 3),
        "nor": compute(dataset, "nor", [-1, -1, -1], 1),
        # _xor = compute(dataset, "and", [1], dataset),
        # _xnor = compute(dataset, "xnor", [], dataset)
    }

    for gate in gates:
        print_template(dataset, gate, gates[gate])



if __name__ == '__main__':
    main()
```

output:


Activities
Terminal
May 28 1:14 PM
↓443B/s ↑1.83K/s
prem@prem-HP-Pavilion-15-Notebook-PC: ~/41310_LP4/SCOA/Assignment 4
prem@prem-HP-Pavilion-15-Notebook-PC:~/41310_LP4/SCOA/Assignment 4$ python3 perceptron.py
Logic Function: AND
X0 X1 X2 Y
0 0 0 0.0
0 0 1 0.0
0 1 0 0.0
0 1 1 0.0
1 0 0 0.0
1 0 1 0.0
1 1 0 0.0
1 1 1 1.0
Logic Function: OR
X0 X1 X2 Y
0 0 0 0.0
0 0 1 1.0
0 1 0 1.0
0 1 1 1.0
1 0 0 1.0
1 0 1 1.0
1 1 0 1.0
1 1 1 1.0
Logic Function: NOT
X0 X1 X2 Y
0 0 0 1.0
0 0 1 0.0
Logic Function: NAND
X0 X1 X2 Y
0 0 0 1.0
0 0 1 1.0
0 1 0 1.0
0 1 1 1.0
1 0 0 1.0
1 0 1 1.0
1 1 0 1.0
1 1 1 0.0
Logic Function: NOR
X0 X1 X2 Y
0 0 0 1.0


Activities
Terminal
May 28 1:14 PM
↓260B/s ↑1.70K/s
prem@prem-HP-Pavilion-15-Notebook-PC: ~/41310_LP4/SCOA/Assignment 4
1 0 1 0.0
1 1 0 0.0
1 1 1 1.0
Logic Function: OR
X0 X1 X2 Y
0 0 0 0.0
0 0 1 1.0
0 1 0 1.0
0 1 1 1.0
1 0 0 1.0
1 0 1 1.0
1 1 0 1.0
1 1 1 1.0
Logic Function: NOT
X0 X1 X2 Y
0 0 0 1.0
0 0 1 0.0
Logic Function: NAND
X0 X1 X2 Y
0 0 0 1.0
0 0 1 1.0
0 1 0 1.0
0 1 1 1.0
1 0 0 1.0
1 0 1 1.0
1 1 0 1.0
1 1 1 0.0
Logic Function: NOR
X0 X1 X2 Y
0 0 0 1.0
0 0 1 0.0
0 1 0 0.0
0 1 1 0.0
1 0 0 0.0
1 0 1 0.0
1 1 0 0.0
1 1 1 0.0
prem@prem-HP-Pavilion-15-Notebook-PC:~/41310_LP4/SCOA/Assignment 4$