4 input OR Gate – Single Layer Perceptron

```
// Single Layer Perceptron Model for 4 input OR Gate with bipolar inputs

clc ;
clear ;
disp("Reeha Parkar - 60001180046");
disp("4 input OR gate implementation using Single Layer Perceptron");

//Training:
//Input
x =[1 1 1 1 1 1 1 1 -1 -1 -1 -1; 1 1 1 1 -1 -1 -1 -1 1 -1 -1 -1; 1 1 -1 -1 1 1 -1 -1 1 1 -1
-1; 1 -1 1 -1 1 -1 1 -1 -1 1 1 -1];
//Target output:
t =[1 1 1 1 1 1 1 1 1 1 1 -1];
//Weights:
w =[0 0 0 0];
//Bias:
b = 0;
//Learning Rate:
alpha = input("Enter learning rate: ") ;
//Threshold value:
threshold = input("Enter threshold value: ") ;

//Number of epochs:
epoch = 0;

flag = 1;

while flag
    flag = 0;

    for i =1:12

        yin = b + x(1,i)*w(1) + x(2,i)*w(2)+ x(3,i)*w(3) + x(4,i)*w(4); // Net input

        //Bipolar Step Activation Function:
        if yin > threshold then
            y =1;
        end
        if yin <= threshold & yin >= -(threshold) then
            y =0;
        end
        if yin < -(threshold) then
            y = -1;
        end

        if y - t(i) then // t=y? condition check
            flag = 1;
            for j = 1:4
                w(j) = w(j) + alpha*t(i)*x(j,i); //Weight Upgrade
            end
            b = b + alpha * t ( i ) //Bias Upgrade
        end
    end
    epoch = epoch + 1; //Increase epochs
    disp("Epoch Number");
    disp(epoch)
    disp("Weights for this epoch");
    disp(w);
    disp("Bias for this epoch");
    disp(b);
end
disp ("Final parameters of 4 input OR gate perceptron") ;
disp ("Weights:") ;
disp (w);
disp ("Bias:") ;
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disp (b);
disp("Total Number of Epochs:");
disp(epoch);

//Testing
disp("Enter 4 bit input");
for i = 1:4
    test_x(i) = input("");
end

test_x = test_x';
test_zin = test_x(1)*w(1) + test_x(2)*w(2) + test_x(3)*w(3) + test_x(4)*w(4);
test_y = 0;
disp("Test net input is: ")
disp(test_zin);

for i =1:4

    //Bipolar Activation Function:
    if test_zin > threshold then
        test_y = 1;
    end
    if test_zin <= threshold & test_zin >= -(threshold) then
        test_y = 0;
    end
    if test_zin < -(threshold) then
        test_y = -1;
    end
end

disp("Final output for Single layer perceptron model for the given input is:");
disp(test_y);
```
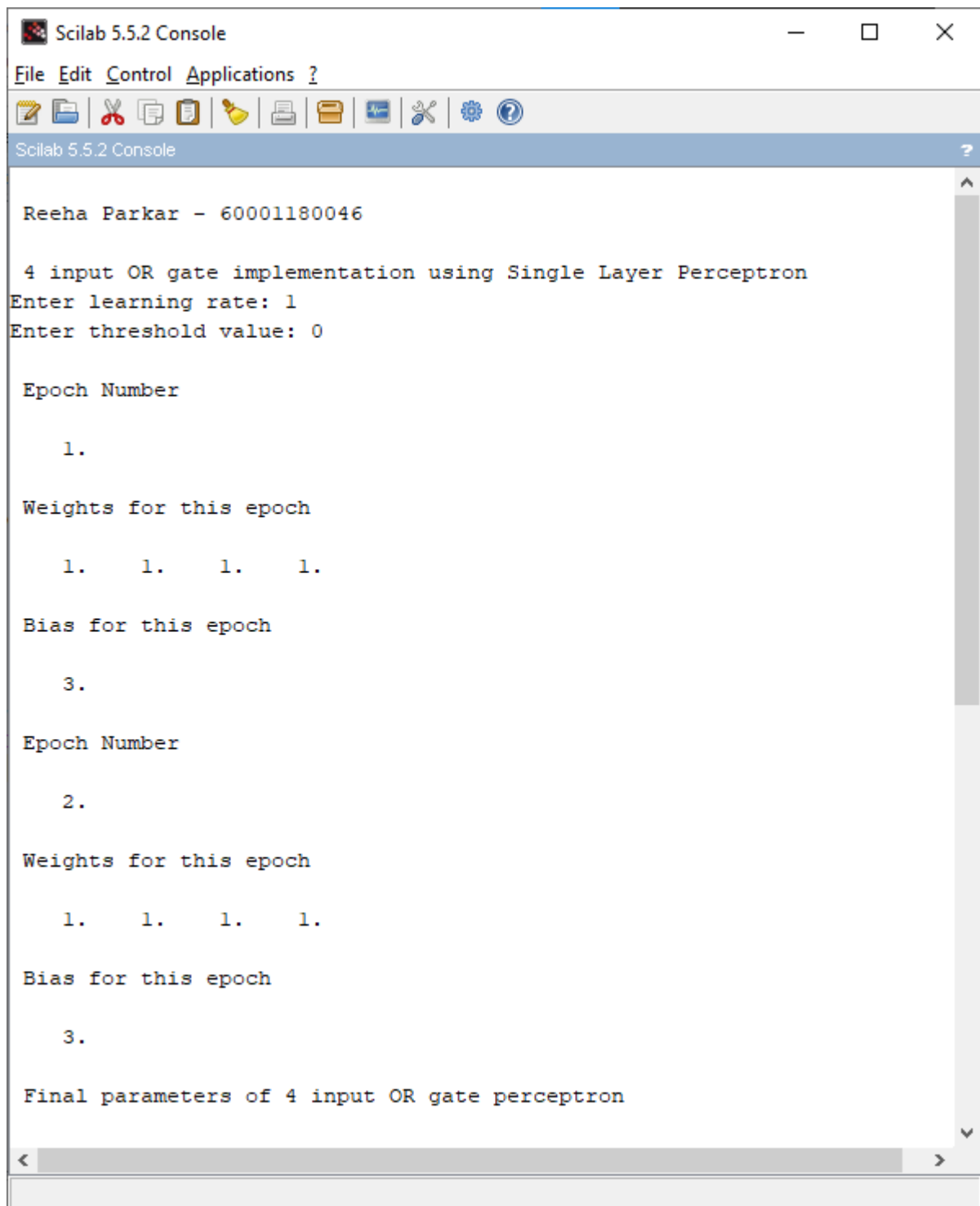
Output:

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File Edit Control Applications ?

Scilab 5.5.2 Console

 Reeha Parkar - 60001180046

 4 input OR gate implementation using Single Layer Perceptron
Enter learning rate: 1
Enter threshold value: 0

 Epoch Number

    1.

Weights for this epoch

    1.   1.   1.   1.

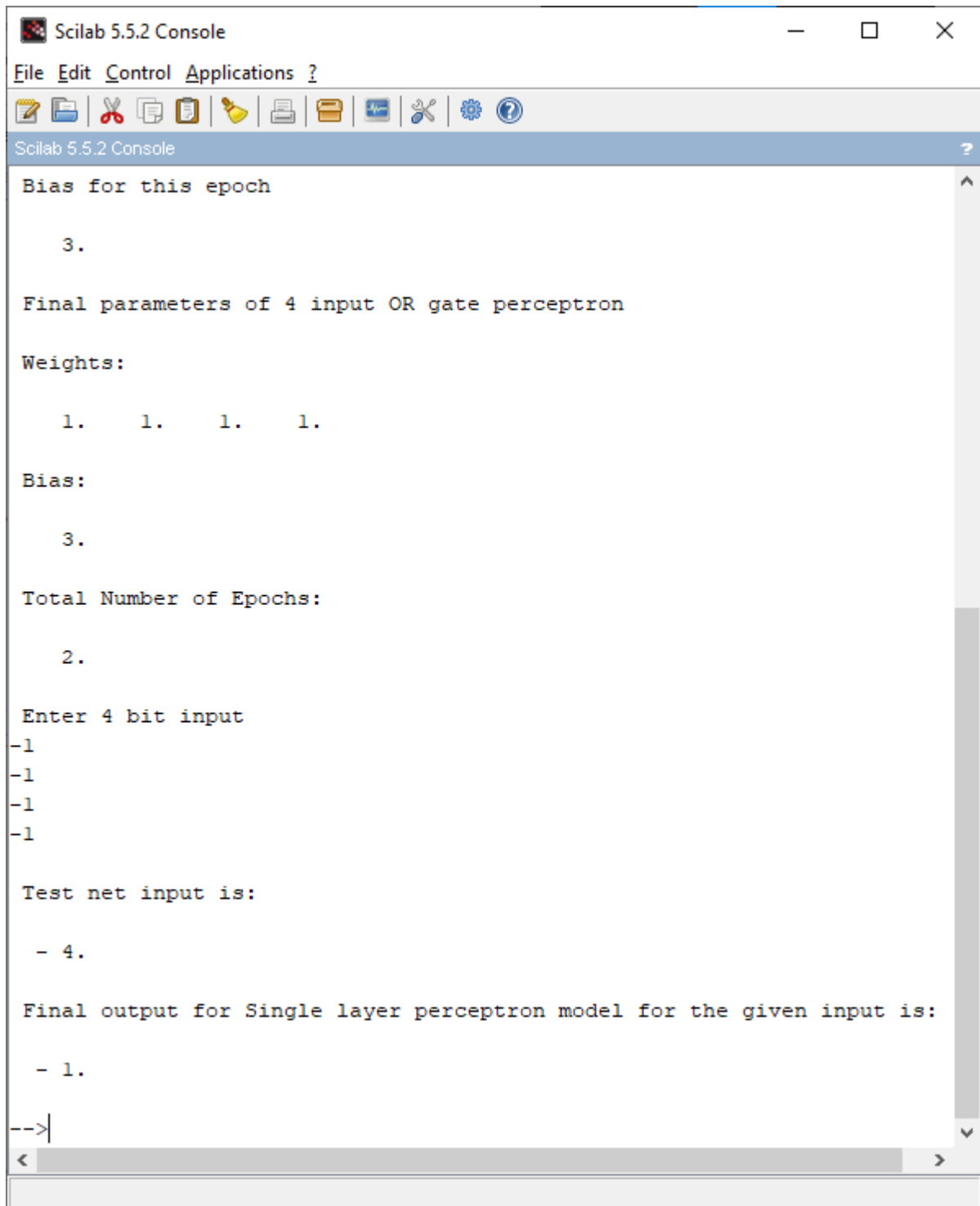Bias for this epoch

    3.

Epoch Number

    2.

Weights for this epoch

    1.   1.   1.   1.

Bias for this epoch

    3.

Final parameters of 4 input OR gate perceptron

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```
 Bias for this epoch

    3.

 Final parameters of 4 input OR gate perceptron

 Weights:

    1.    1.    1.    1.

 Bias:

    3.

 Total Number of Epochs:

    2.

 Enter 4 bit input
-1
-1
-1
-1

 Test net input is:

  - 4.

 Final output for Single layer perceptron model for the given input is:

  - 1.

-->
```