Example#3 : What are the mathematical expressions of the given activation functions? For the Hyperbolic tangent function:

1. What happens when x is +ve large (c const.)?

2. What happens when x is -ve large (c const.)?

3. What happens when x = 0?

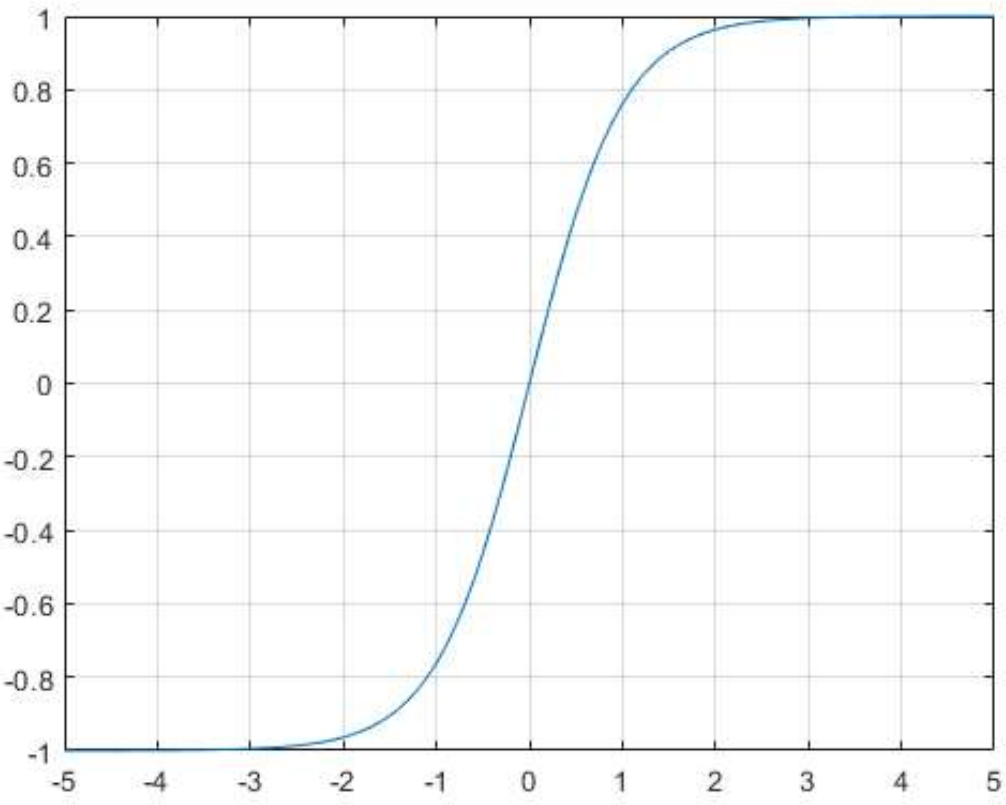
4. What happens when c is large (>1)?

5. When happens when c is <1?

```
% Graph for hyperbolic tangent function
x=-5:0.1:5;
c=1;
Y= (exp(c*x)- exp(-c*x))./(exp(c*x)+ exp(-c*x));
disp(['output Y:' , num2str(Y)]);
```

```
output Y:-0.99991    -0.99989    -0.99986    -0.99983     -0.9998    -0.99975     -0.9997
```

```
plot(x,Y);
grid on;
```




```
% Graph for Sigmoid function
```

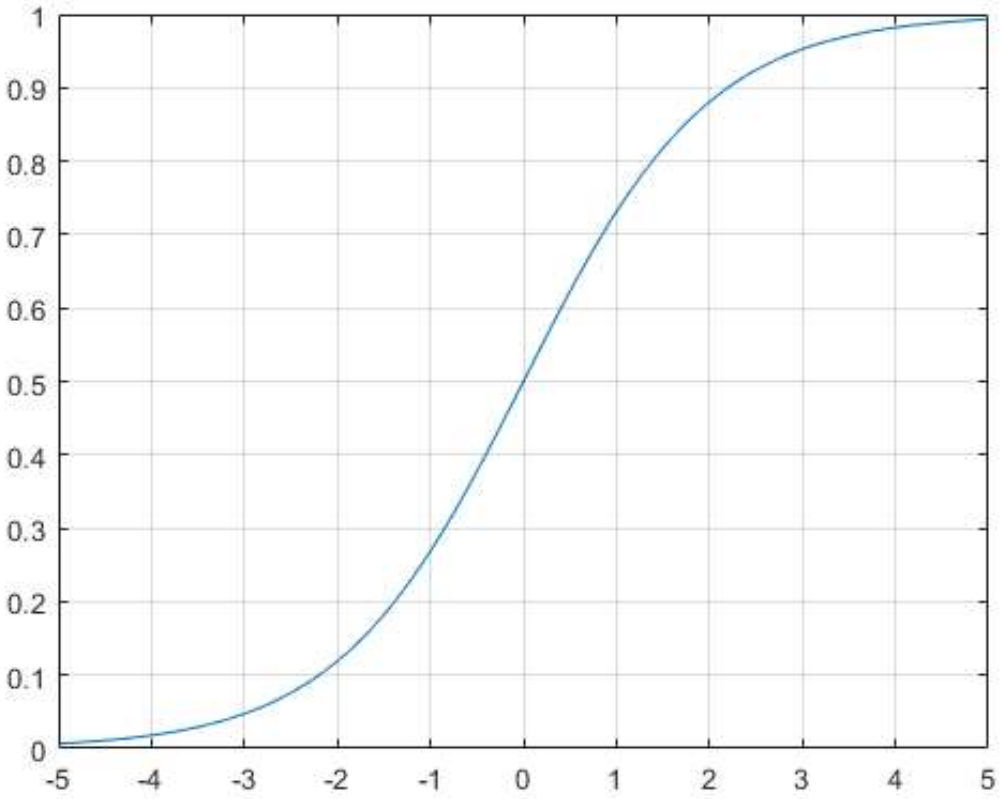
```
x=-5:0.01:5;
c=1
```

```
c = 1
```

```
Output= 1./(1+ exp( - c*x));
disp(['output Y1:' , num2str(Output)]);
```

```
output Y1:0.0066929   0.0067597   0.0068271   0.0068953   0.0069641   0.0070336   0.0071038
```

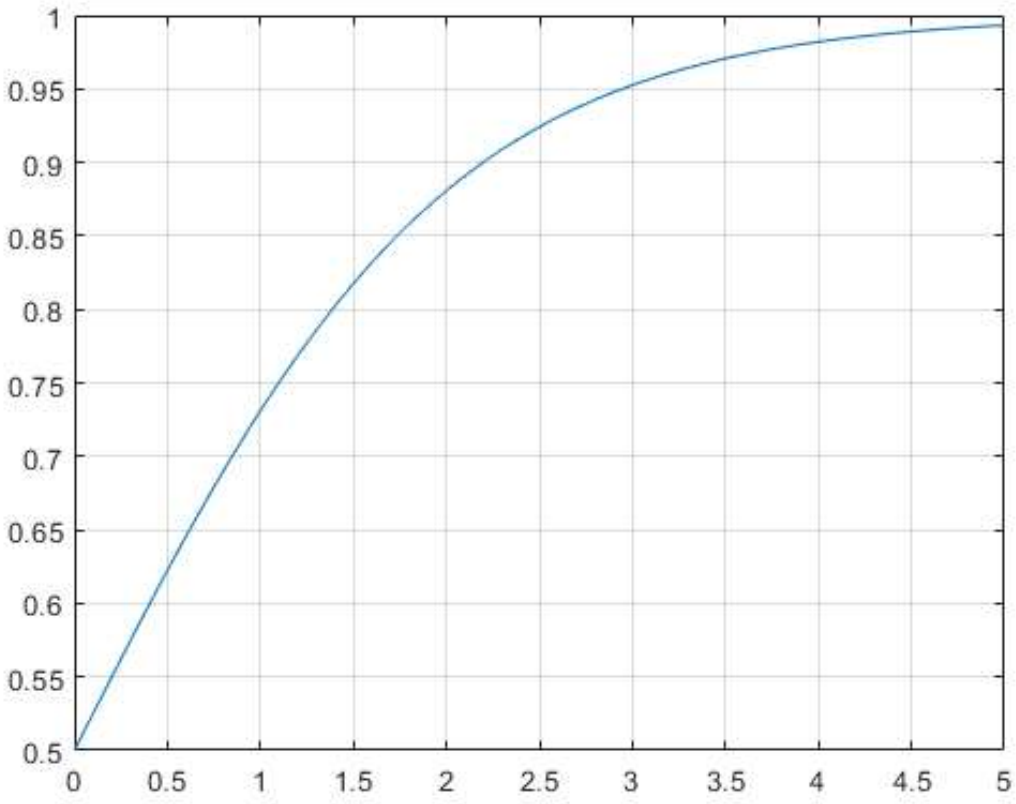
```
plot(x,Output);
grid on;
```




```
% What happens when x is +ve large (c const.)
x=0:0.01:5;
output= 1./(1+ exp( - x));
disp(['output Y2:' , num2str(output)]);
```

```
output Y2:0.5      0.5025      0.505      0.5075       0.51      0.5125       0.515      0.5
```

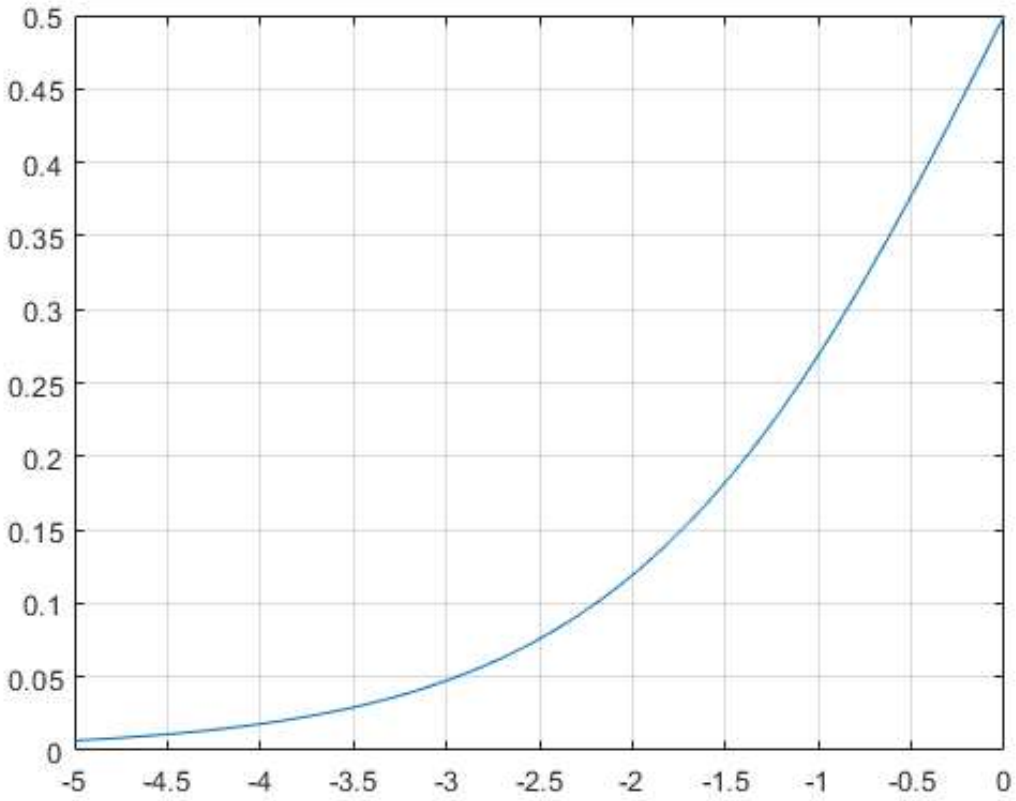
```
plot(x,output);
grid on;
```




```
% What happens when x is -ve large (c const.)
x=-5:0.1:0;
Y3= 1./(1+ exp( - x));
disp(['output Y3:' , num2str(Y3)]);
```

```
output Y3:0.0066929   0.0073915   0.0081626   0.0090133   0.0099518    0.010987    0.012128
```

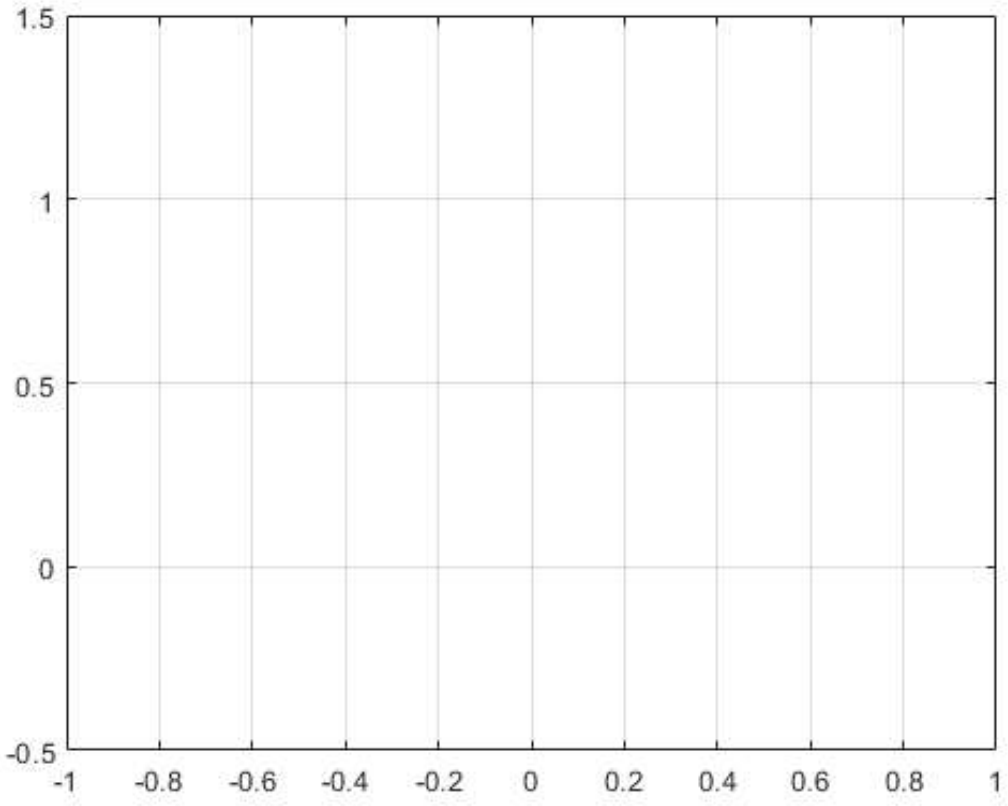
```
plot(x,Y3);
grid on;
```




```
% What happens when x = 0
x=0:0.1:0;
Y4= 1./(1+ exp( - x));
disp(['output Y4:' , num2str(Y4)]);
```

```
output Y4:0.5
```

```
plot(x,Y4);
grid on;
```



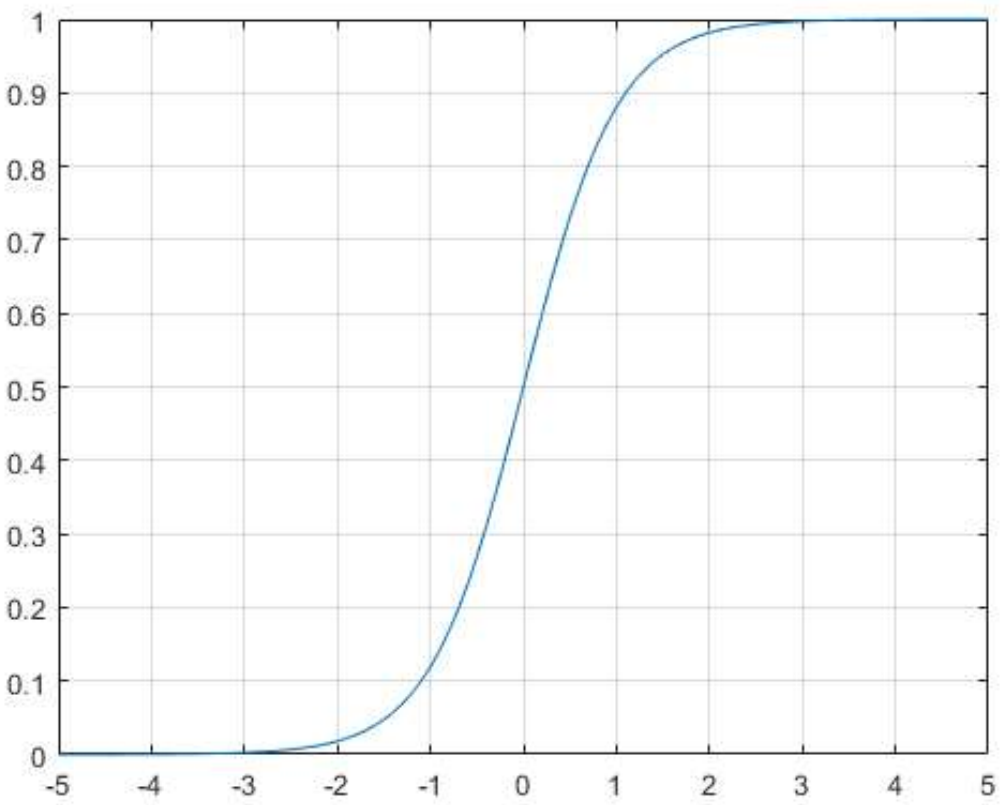

```
% What happens when c is large (>1)
x=-5:0.1:5;
c=2
```

```
c = 2
```

```
Y5=1 ./(1+exp(-c*x));
disp(['output Y5', num2str(Y5)])
```

```
output Y54.5398e-05  5.5449e-05  6.7724e-05  8.2717e-05  0.00010103  0.00012339  0.00015071  0
```

```
plot(x,Y5)
grid on;
```



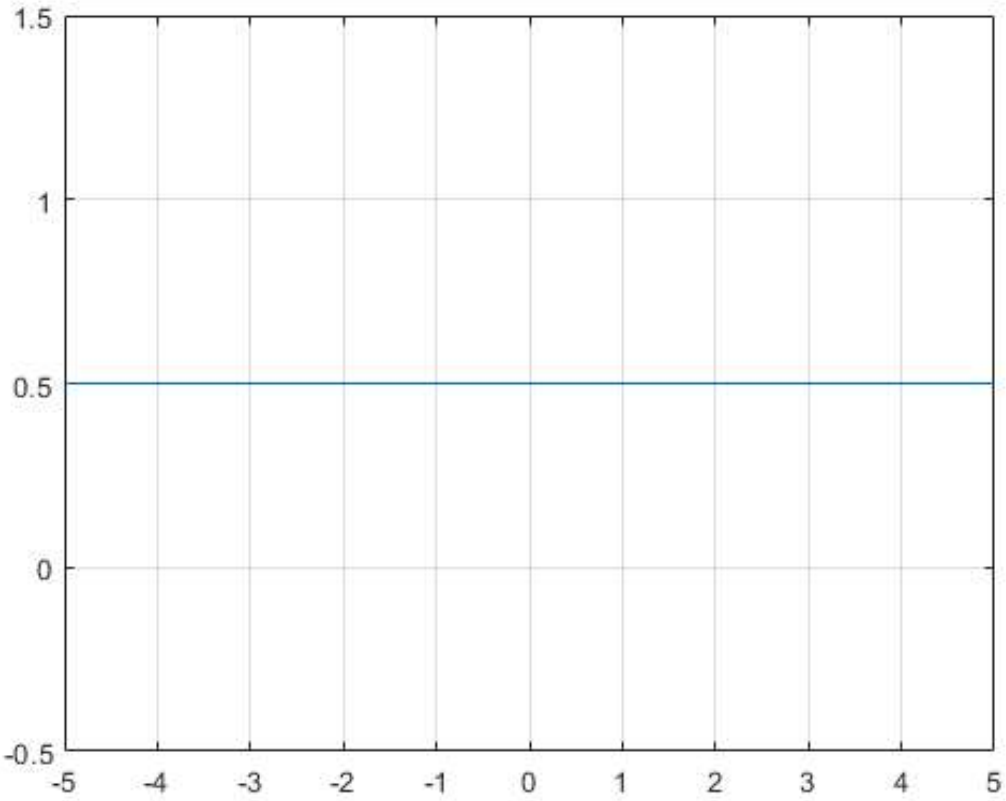

```
% What happens when c is large (<1)
x=-5:0.1:5;
c=0;
Y6=1 ./(1+exp(-c*x))
```

```
Y6 = 1×101
    0.5000    0.5000    0.5000    0.5000    0.5000    0.5000    0.5000    0.5000    0.5000
```

```
disp(['output Y6',num2str(Y6)]);
```

```
output Y60.5         0.5         0.5         0.5         0.5         0.5         0.5         0
```

```
plot(x,Y6)
grid on;
```


1.5
1
0.5
0
-0.5
-5
-4
-3
-2
-1
0
1
2
3
4
5