VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Lab Assessment - 2

Fall Semester 2021-22

MAT1011: Calculus for Engineers

L41+L42

By

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18BIS0043

https://github.com/allenalvin333/College_Written/tree/master/MAT1011_MATLAB

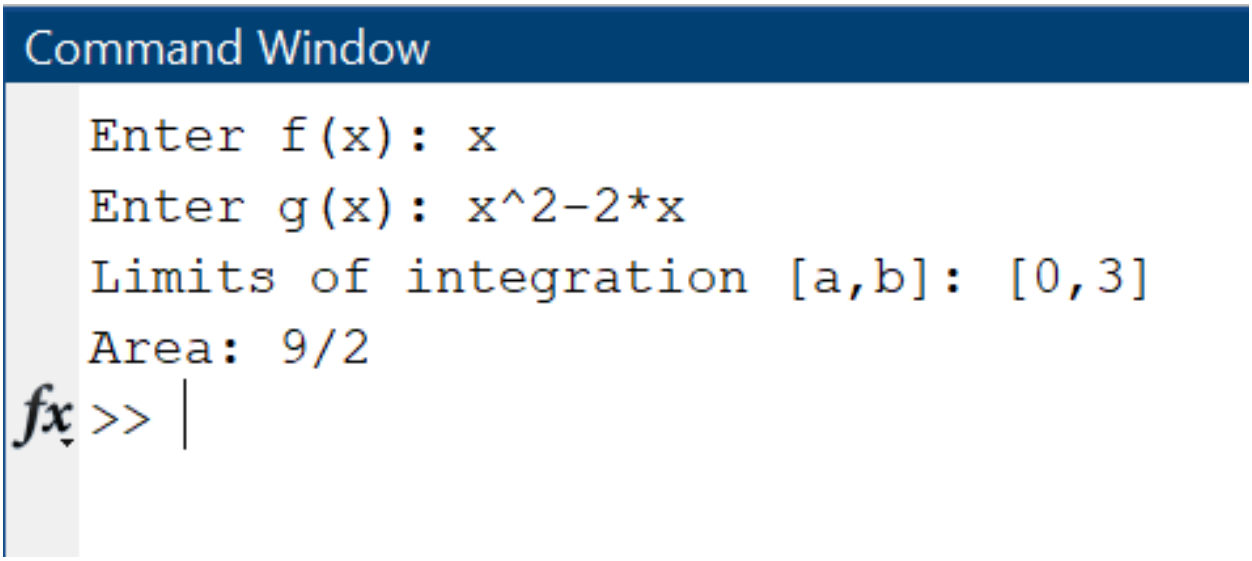
1. Using MATLAB, find the area of the region bounded by the curve $y=x^2-2x$ and the line $y=x$

Code

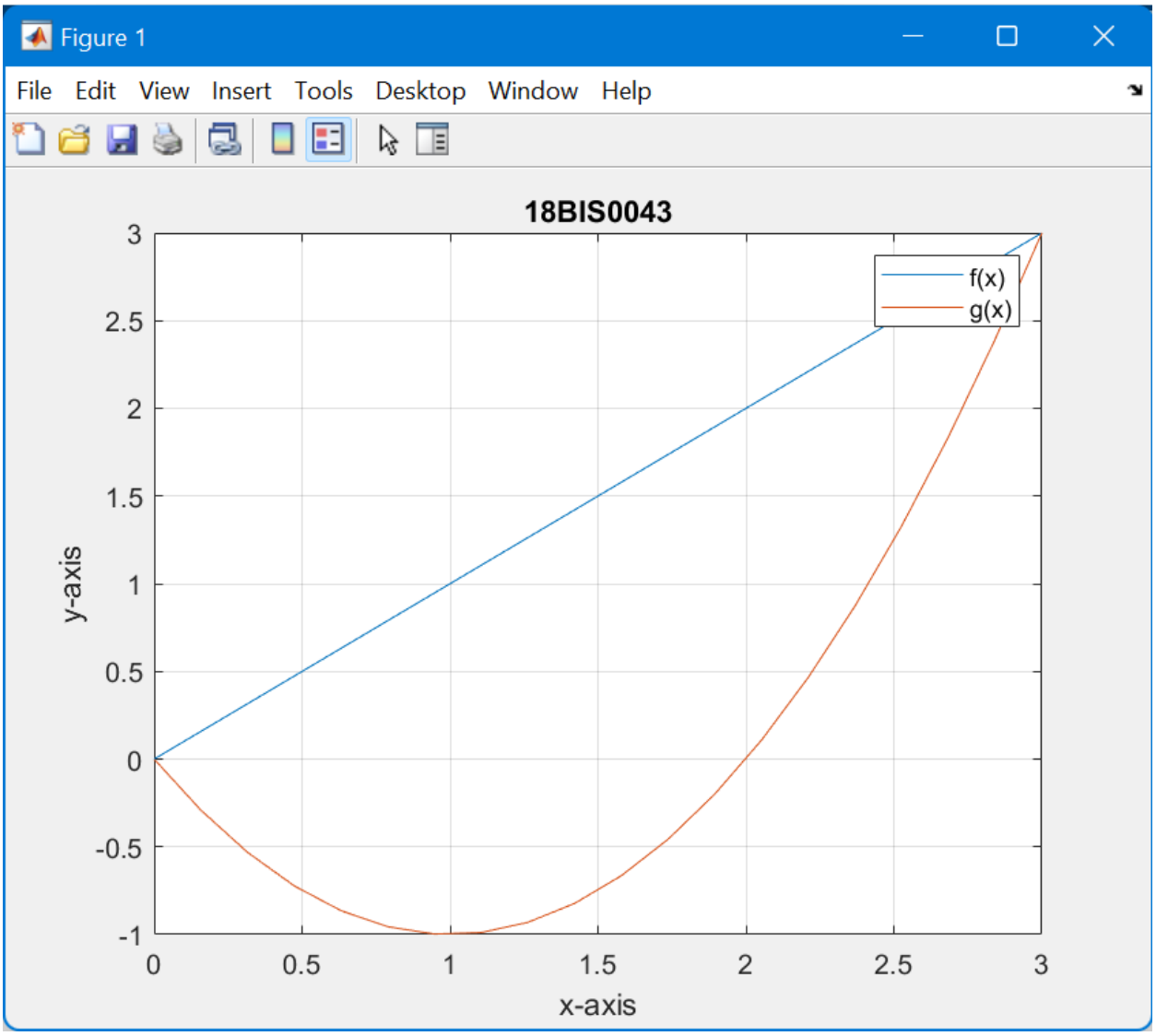
```
clc

clear all

close all

syms x

f=input('Enter f(x): ');

g=input('Enter g(x): ');

L=input('Limits of integration [a,b]: ');

a=L(1); b=L(2);

Area=int(f-g,x,a,b);

disp(['Area: ',char(Area)]);

x1=linspace(a,b,20);

y1=subs(f,x,x1); x2=x1;

y2=subs(g,x,x1);
```

```
plot(x1,y1); hold on;

plot(x2,y2); hold off;

xlabel('x-axis'); ylabel('y-axis');

legend('f(x)','g(x)'); grid on;

title ("18BIS0043");
```

Console



Output



The functions meet at points x=0 and x=3 and they should be the limits of integration.

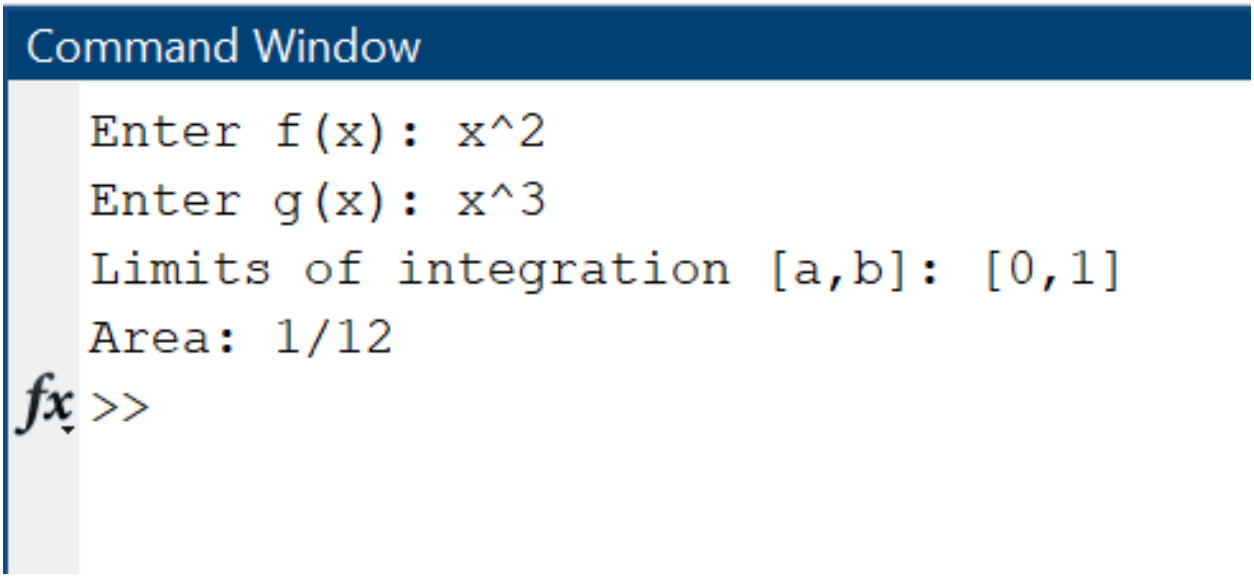
2. Using MATLAB, find the area of the region bounded by the curves $y=x^3$ and $y=x^2$

Code

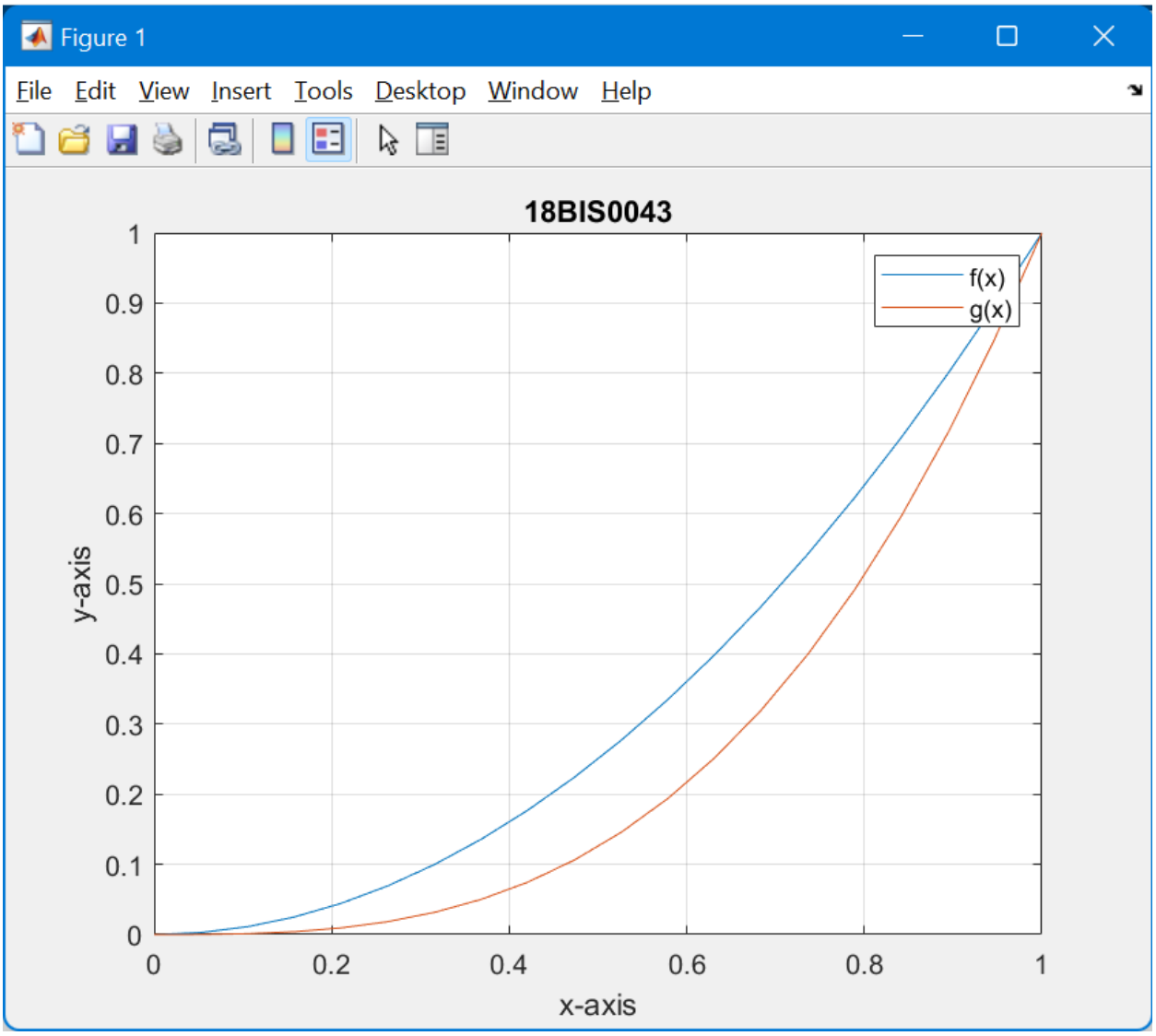
```
clc

clear all

close all

syms x

f=input('Enter f(x): ');

g=input('Enter g(x): ');

L=input('Limits of integration [a,b]: ');

a=L(1); b=L(2);

Area=int(f-g,x,a,b);

disp(['Area: ',char(Area)]);

x1=linspace(a,b,20);

y1=subs(f,x,x1); x2=x1;

y2=subs(g,x,x1);
```

```
plot(x1,y1); hold on;

plot(x2,y2); hold off;

xlabel('x-axis'); ylabel('y-axis');

legend('f(x)','g(x)'); grid on;

title ("18BIS0043");
```

Console



Output



The functions meet at points x=0 and x=1 and they should be the limits of integration.

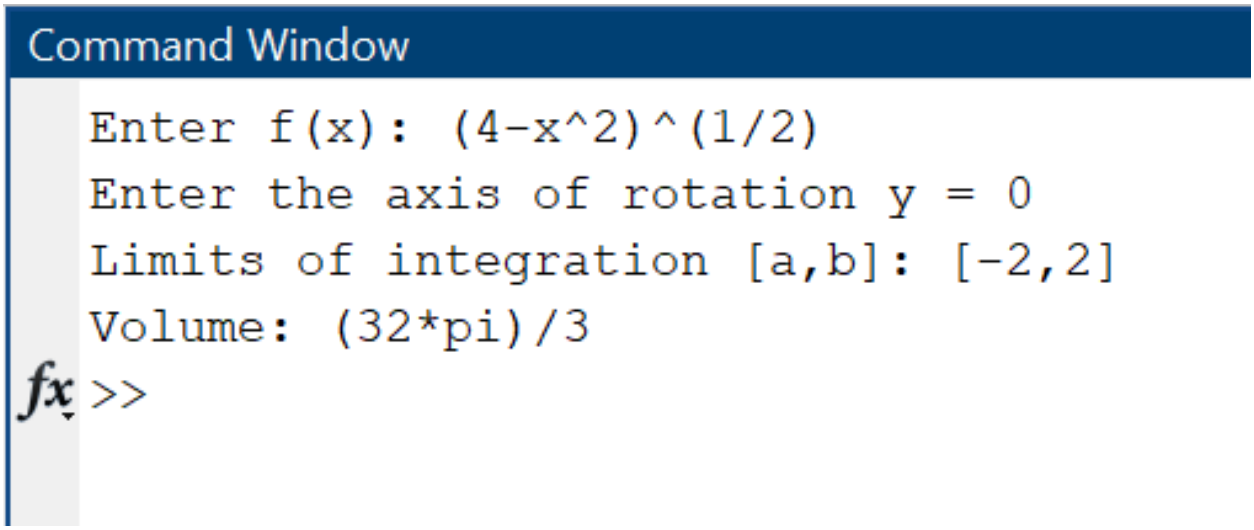
3. Using MATLAB, find the volume of the sphere formed by rotating a semicircle of radius 2 units about the x-axis

Code

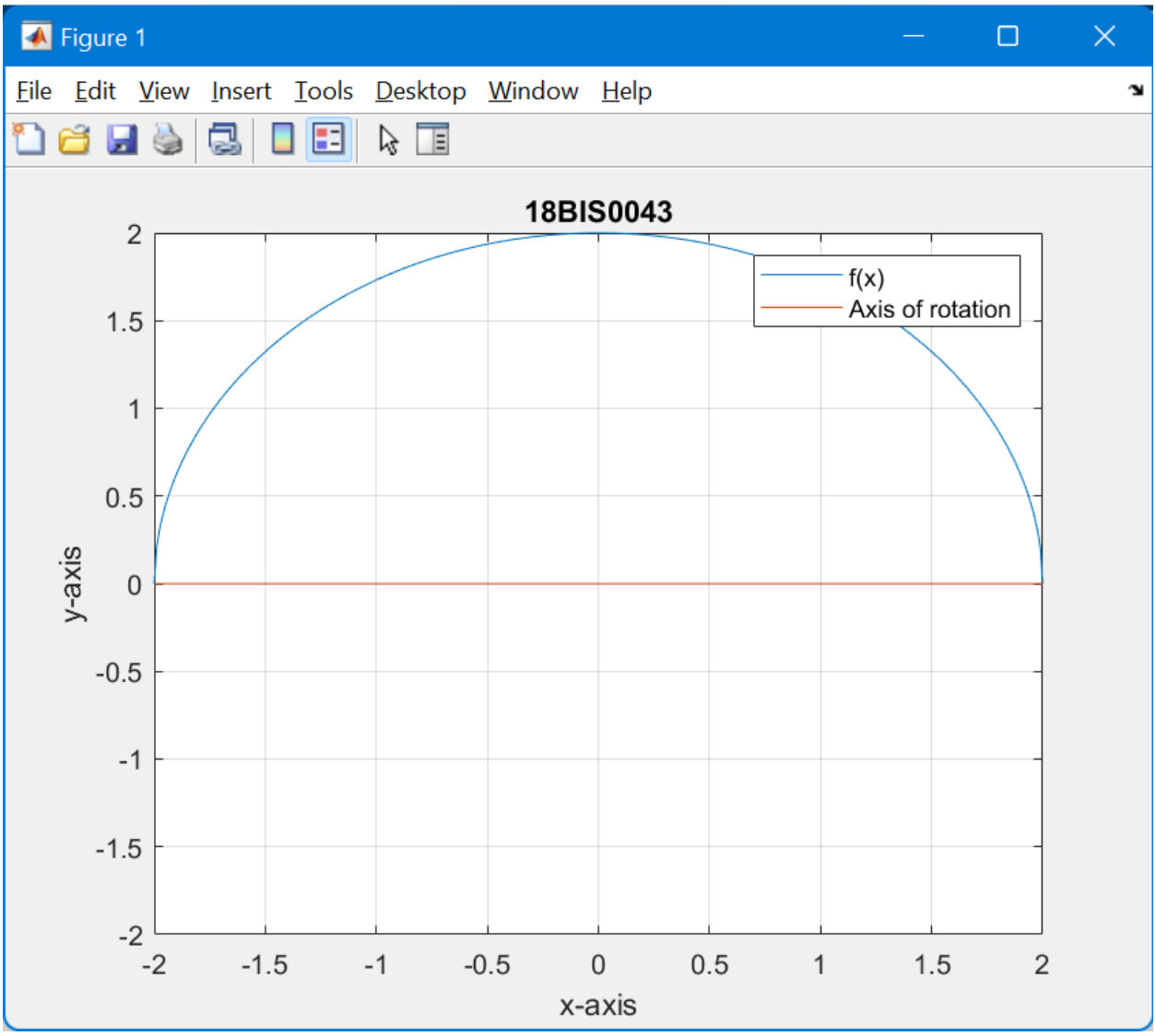
```
clc

clear all

close all

syms x

f=input('Enter f(x): ');

c=input('Enter the axis of rotation y = ');

L=input('Limits of integration [a,b]: ');

a=L(1); b=L(2);

Vol=pi*int((f-c)^2,a,b);

disp(['Volume: ',char(Vol)]);

x1=linspace(a,b,400); y1=subs(f,x,x1);

x2=x1; y2=c*ones(length(x1));
```

```
plot(x1,y1);

xlim([-2 2]); ylim([-2 2]);

hold on;

plot(x2,y2);

xlim([-2 2]); ylim([-2 2]);

hold off;

xlabel('x-axis'); ylabel('y-axis')

legend('f(x)','Axis of rotation');

grid on;

title ("18BIS0043");
```

Console



Output



Circle of radius 2 units has the equation $x^2+y^2=4$, which implies $y=(4-x^2)^{1/2}$ for the semi-circle and limits of integration should be x=2 and x=-2.

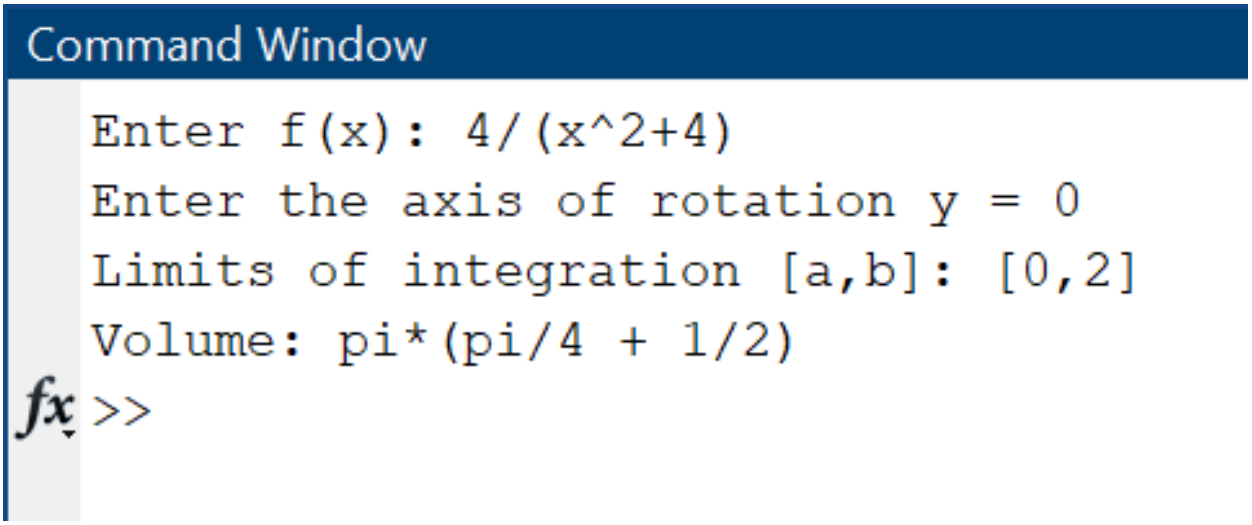
4. Using MATLAB, find the volume of the solid generated by revolving about the x-axis, the region bounded by the curve $y=4/(x^2+4)$, the lines x=0 and x=2 and the x-axis

Code

```
clc

clear all

close all

syms x

f=input('Enter f(x): ');

c=input('Enter the axis of rotation y = ');

L=input('Limits of integration [a,b]: ');

a=L(1); b=L(2);

Vol=pi*int((f-c)^2,a,b);

disp(['Volume: ',char(Vol)]);

x1=linspace(a,b,400); y1=subs(f,x,x1);

x2=x1; y2=c*ones(length(x1));
```

```
plot(x1,y1);

xlim([0 2]); ylim([0 2]);

hold on;

plot(x2,y2);

xlim([0 2]); ylim([0 2]);

hold off;

xlabel('x-axis'); ylabel('y-axis')

legend('f(x)','Axis of rotation');

grid on;

title ("18BIS0043");
```

Console



Output

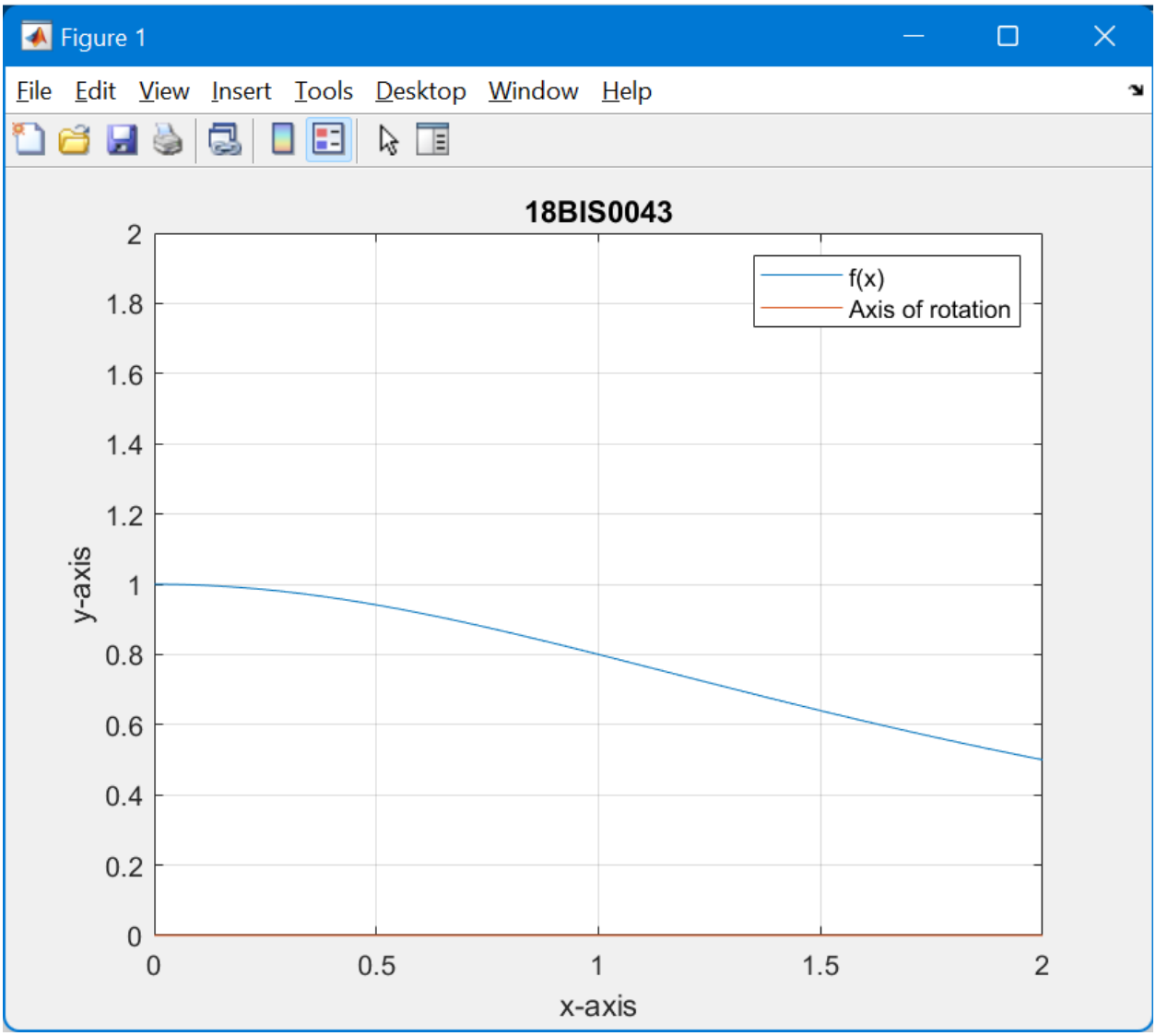


Figure 1
File Edit View Insert Tools Desktop Window Help
18BIS0043
f(x)
Axis of rotation
y-axis
x-axis
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
0.5
1
1.5
2