# MATH 152 Lab 2

Put team members' names and section number here.

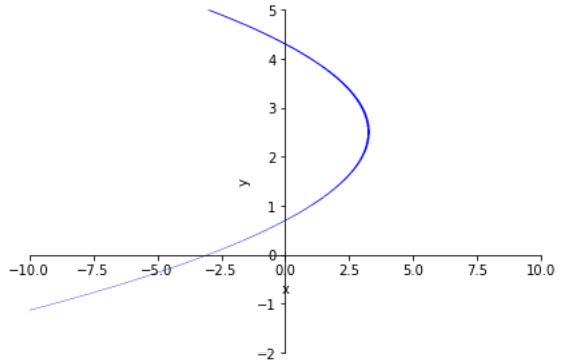
In [1]:
```
from sympy import *
from sympy.plotting import (plot,plot_implicit)
```

## Question 1

### 1a

In [2]:
```
#start code here
x, y = symbols("x y")

equation = Eq(x, -1 * y**2 + 5*y - 3)
plot_implicit(equation, (x, -10, 10), (y, -2, 5))
```




Out[2]: <sympy.plotting.plot.Plot at 0x19c5b027820>

### 1b

In [3]:
```
#start code here
print(solve(equation.subs(x, 0), y))
```

```
[5/2 - sqrt(13)/2, sqrt(13)/2 + 5/2]
```

### 1c

In [4]:
```
volume = integrate(pi * (-1 * y**2 + 5*y - 3)**2, (y, solve(equation.subs(x, 0), y)[0], solve(equation.subs(x, 0), y)[1]))
print(N(volume))
```

```
63.8097434818162
```

## Question 2

### 2a

In [5]:
```
#start code here
volume = integrate(pi * cos(x)**2, (x, 0, solve(sin(x) - cos(x))[0])) - integrate(pi * sin(x)**2, (x, 0, solve(sin(x) - cos(x))[0
print(N(volume))
```

```
1.57079632679490
```

### 2b

In [6]:
```
#start code here
volume = pi * integrate(asin(y)**2, (y, 0, sqrt(2)/2)) + pi * integrate(acos(y)**2, (y, sqrt(2)/2, 1))
print(N(volume))
```

```
0.695678892459293
```

**2c**

In [7]:
```
volume = 2 * pi * integrate(x * (cos(x) - sin(x)), (x, 0, pi/4))
print(N(volume))
```

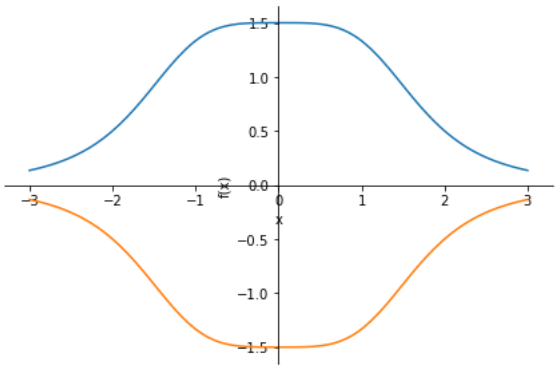
```
0.695678892459293
```

## Question 3

**3a**

In [8]:
```
#start code here
fx = 12 / (8 + x**4)

plot((fx, (x, -3 ,3)), (-1 * fx, (x, -3 ,3)))
```




Out[8]:
```
<sympy.plotting.plot.Plot at 0x19c58d7b3d0>
```

**3b**

In [9]:
```
#start code here
surfaceArea = integrate(fx, (x, -3, 3)) - integrate(-fx, (x, -3, 3))
print(N(surfaceArea))
```

```
10.6390331471780
```

**3c**

In [10]:
```
volume = integrate(pi * fx**2, (x, -3, 3))
print(N(volume))
```

```
19.7537908960011
```

##Question 4

###4ai

In [11]:
```
#start code here
f=(E**(-sqrt(x)))
g=((E**(-cos(x)))*(sin(2*x)))
h=((2*x)*(E**(-x)))

fint=integrate(f,(x,0,1))
gint=integrate(g,(x,0,pi/2))
hint=integrate(h,(x,0,1))

print("Integration of f is ", fint.evalf())
```

```
Integration of f is  0.528482235314231
```

###4aii

In [12]:
```
#start code here
print("Integration of g is ", gint.evalf())
```

```
Integration of g is  0.528482235314231
```

###4aiii

In [13]:
```
#start code here
print("Integration of h is ", hint.evalf())

print("Therefore, all three integrals are equal")
```

```
Integration of h is  0.528482235314231
Therefore, all three integrals are equal
```

###4b

In [14]:
```
#start code here
print("For the first integral (i), u has to be square root of x, which will make du as 1/2*u. Bound will not change as 0 and 1 st
print("\n")
print("For the second integral (ii), u has to be cos(x), which will make du as -sin(x). Then change sin(2x) into 2sin(x)cos(x). s
```

```
For the first integral (i), u has to be square root of x, which will make du as 1/2*u. Bound will not change as 0 and 1 stays t
he same under square root of x


For the second integral (ii), u has to be cos(x), which will make du as -sin(x). Then change sin(2x) into 2sin(x)cos(x). sin(x)
should be canceled out and bound will be changed [0,1]
```

In [ ]: