MATH 151 Lab 7

Put team members' names and section number here.

```
In [2]:   from sympy import *
          from sympy import Symbol, N
          from sympy.plotting import (plot,plot_parametric)
```

Question 1

1a

```
In [55]:  x = symbols('x')

          f1 = 8 - x**2

          f2 = 5* exp(-(((x-2)/2)**2)) + x

          def find_critical_vals(eq, x1, x2):

              e = diff(eq,x)

              solutions = nsolve(e,3)

              den = denom(e)

              return [solutions]




          print("critical values for the function inlude where x=", nsolve(diff(f2,x),3), nsolve
          print("critical values for the function inlude where x=", find_critical_vals(f1,-5,5))
```

```
critical values for the function inlude where x= 2.41784619385985  4.78643377270907
critical values for the function inlude where x= [0]
```

1b

```
In [60]:  print("extreme max over the interval [-5,5] is where x = 0")
          print("extrema min over the interval [-5,5] where x approaches  x = -5")
```

```
extreme max over the interval [-5,5] is where x = 0
extrema min over the interval [-5,5] where x approaches  x = -5
```

1c

```
In [59]:  print("extrema for the function inlude along the interval as in function max is where
          print("extrema for the function inlude along the interval as in function min is where
```

```
  Input In [59]
    print("extrema for the function inlude along the interval as in function min is w
here x = -10)
                                                                                    ^
SyntaxError: EOL while scanning string literal
```
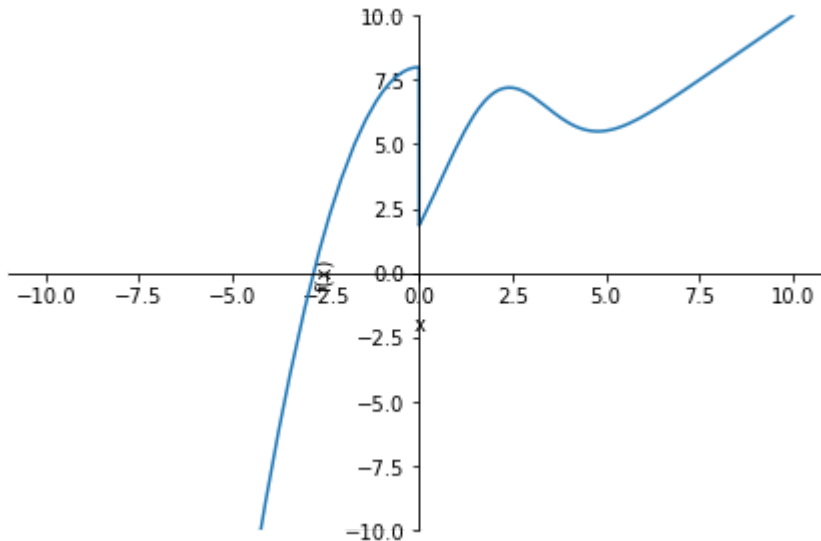
1d

```
In [40]:  plot((Piecewise((f1,x<0),(f2,x>=0)),(x,-10,10)),ylim=[-10,10])
```



```
Out[40]:  <sympy.plotting.plot.Plot at 0x1b198922730>
```

Question 2

2a

```
In [73]:  r = symbols('r')
          k = symbols('k')
          r0 = symbols('r0')

          v = k*(r0-r) * r ** 2

          q = diff(v,r0)

          print("the mav v value occurs at 1/2 r initial because it is closest to r = 0 which is
```

the mav v value occurs at 1/2 r initial because it is closest to 0 which is the absol
ute max

2b

```
In [76]:  print("the absolute max value of v over that interval is", v.subs(.5*r0, r))
```

the absolute max value of v over that interval is k*r**2*(-r + r0)

2c

```
In [84]:  r = symbols('r')
          k = 15000
          r0 = .65

          v = k*(r0-r) * r ** 2



          v.subs(k,15000)
          v.subs(r0,.65)

          q = diff(v,r)

          pp = solve(q,r)



          print("where r = .65 and k is 15000 the max value of the function is at r = ",pp, "and
```
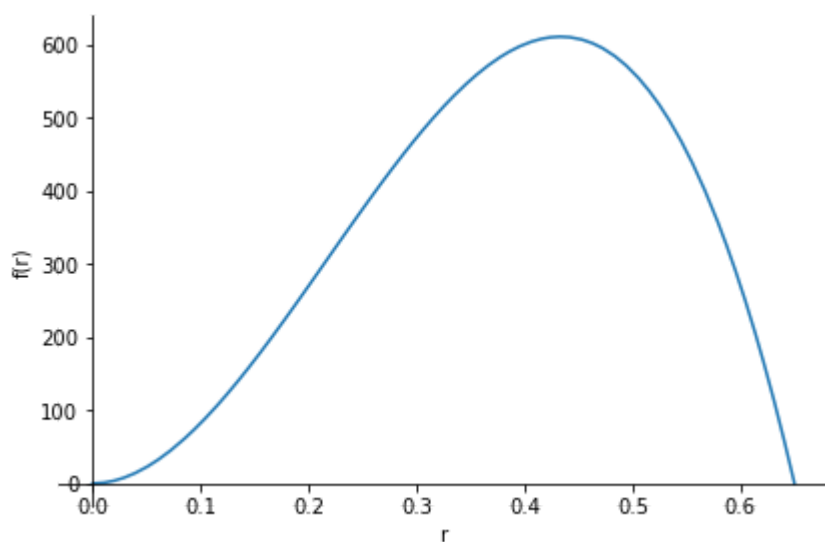
where r = .65 and k is 15000 the max value of the function is at r = [0.0, 0.4333333
33333333] and the value of v at the point is 610.277777777778

2d

```
In [85]:  plot(v,(r,0,r0))
```



```
Out[85]:  <sympy.plotting.plot.Plot at 0x1b19a206eb0>
```

Question 3

3a

```
In [92]:  x = symbols('x')

          f = atan(x)
          g = acot(x)

          print((diff(f,x) + diff(g,x)))

          0
```
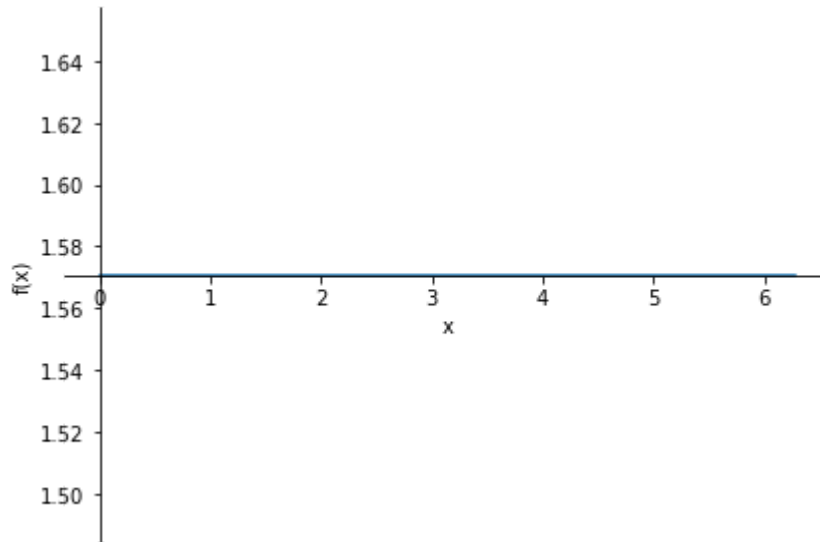
3b

```
In [93]:  print("the graph will just be a straight line, the derriviatves of these functions are
```

the graph will just be a straight line, the derriviatves of these functions are the s
ame one is just negative

3c

```
In [98]:  p =f+g
          plot(p,(x,0,2*3.14))
          print("simplified function is just y = 0")
```



```
Out[98]:  <sympy.plotting.plot.Plot at 0x1b19a538790>
```

3d

```
In [99]:  print("when taking a look at cofucntion identities we see that all co identities are e
```

when taking a look at cofucntion identities we see that all co identities are effecti
vely theta plus pi/2, which if we take a look at the unit circle we see that any trig
value will become negative with an offset of pi/2 or 90 degrees

```
In [ ]:
```