MATH 151 Lab 2

Put team members' names and section number here.

```
In [1]:  from sympy import *
         from sympy.solvers import solve
         from sympy import Symbol
         from sympy.plotting import (plot,plot_parametric)
```

Question 1

1a

```
In [2]:  #start code here
         x = Symbol('x')
         f = 1 + x*(x+1)*(x+2)*(x+3)
         l = solve(f)
         print("Exact form",l)
         print("Approximate form",[i.evalf() for i in l])
```

```
Exact form [-3/2 - sqrt(5)/2, -3/2 + sqrt(5)/2]
Approximate form [-2.61803398874989, -0.381966011250105]
```

1b

```
In [3]:  print("Expanded form:",f.expand())
```
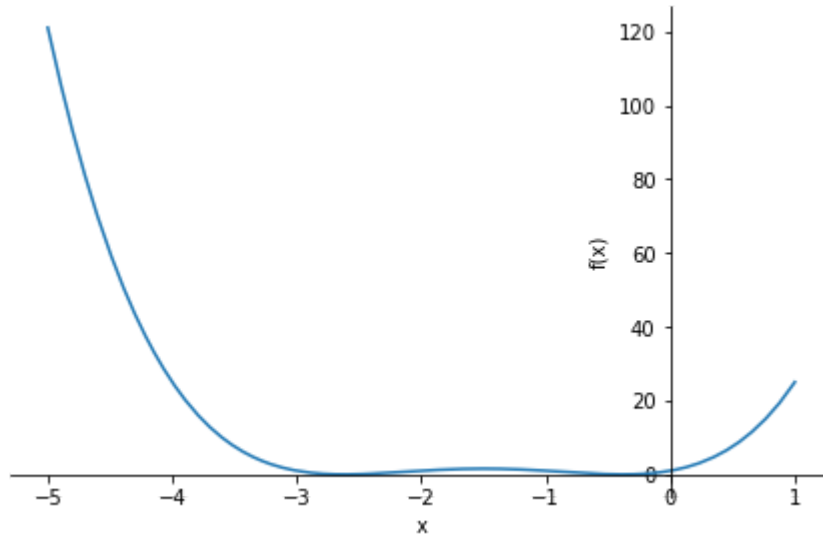
```
Expanded form: x**4 + 6*x**3 + 11*x**2 + 6*x + 1
```

1c

```
In [4]:  print("Factored form",f.factor())
```

```
Factored form (x**2 + 3*x + 1)**2
```

1d

```
In [5]: plot(f,(x,-5,1))
```



```
Out[5]: <sympy.plotting.plot.Plot at 0x2306ace97c0>
```

Question 2

2a

```
In [6]: #start code here
        t = Symbol('t')
        g = 9.8
        hi = 6
        fa = -.5*g*(t**2)+hi
        l = solve(fa)
        print("the textbook hits the ground at t = ", [i for i in l if i > 0][0], "second
```

```
the textbook hits the ground at t =   1.10656667034498 seconds
```

2b

In [7]:
```python
#start code here
t = Symbol('t')
g = 9.8
hi = 6
R = 2
fb = (-1*g*t)-(R*g*exp(-t/R))+(R*g)+hi/R
l = solve(fb)
print("with an the textbook hits the ground at t = ", [i for i in l if i > 0][0],
```
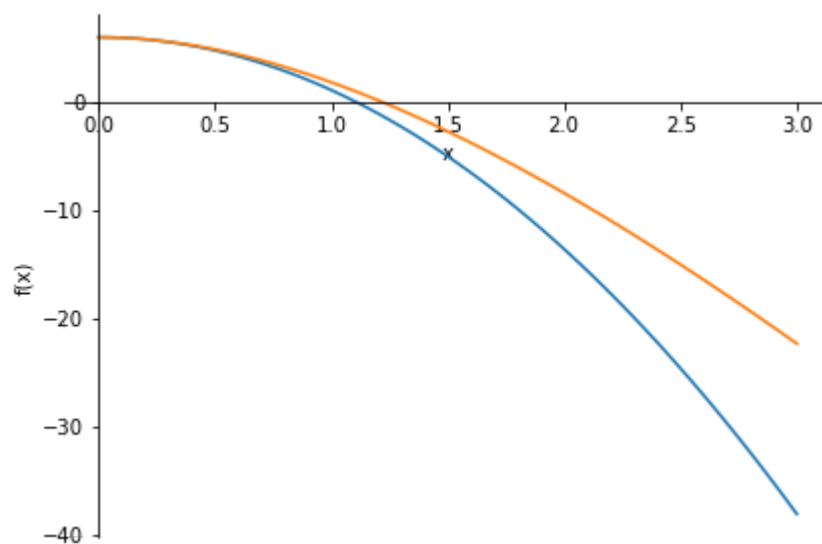
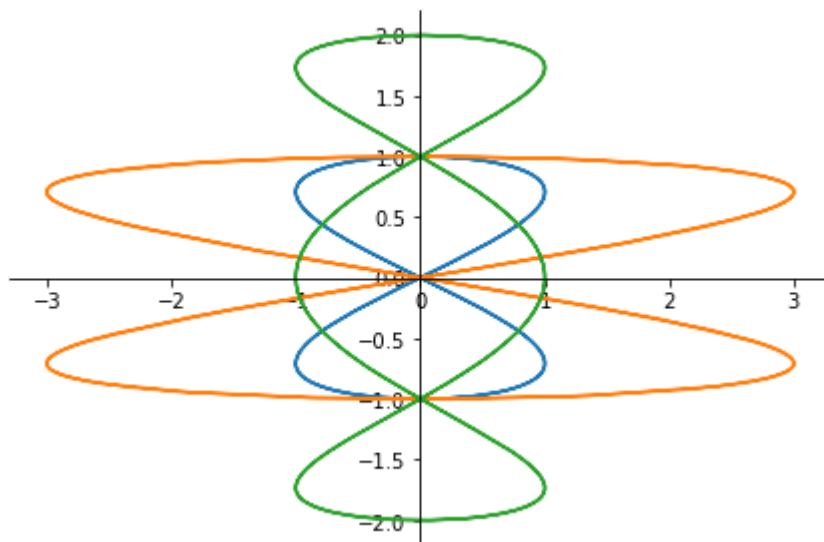with an the textbook hits the ground at t = 1.21873095569557 seconds

2c

In [8]:
```python
#start code here
t = Symbol('t')
g = 9.8
hi = 6
R = 2
fb = (-R*g*t)-(R**2*g*exp(-t/R))+(R**2*g)+hi
fa = -.5*g*(t**2)+hi
fabplot = plot((fa,(t,0,3)),(fb,(t,0,3)))
```


Question 3

3a

In [9]:
```python
#start code here
xt1 = sin(2*t)
yt1 = cos(t)
xt2 = 3*sin(2*t)
yt2 = cos(t)
xt3 = sin(3*t)
yt3 = 2*cos(t)
paraplot = plot_parametric((xt1,yt1,(t,0,4*pi)),(xt2,yt2,(t,0,4*pi)),(xt3,yt3,(t,
```


3b

In [10]:
```python
#start code here
print(" a affects the horizontal width of the parametric curve")
print(" b affects the vertical height of the parametric curve")
print(" n affects the number of times parametric curve crosses the y axis")
```

```
 a affects the horizontal width of the parametric curve
 b affects the vertical height of the parametric curve
 n affects the number of times parametric curve crosses the y axis
```

In [ ]: