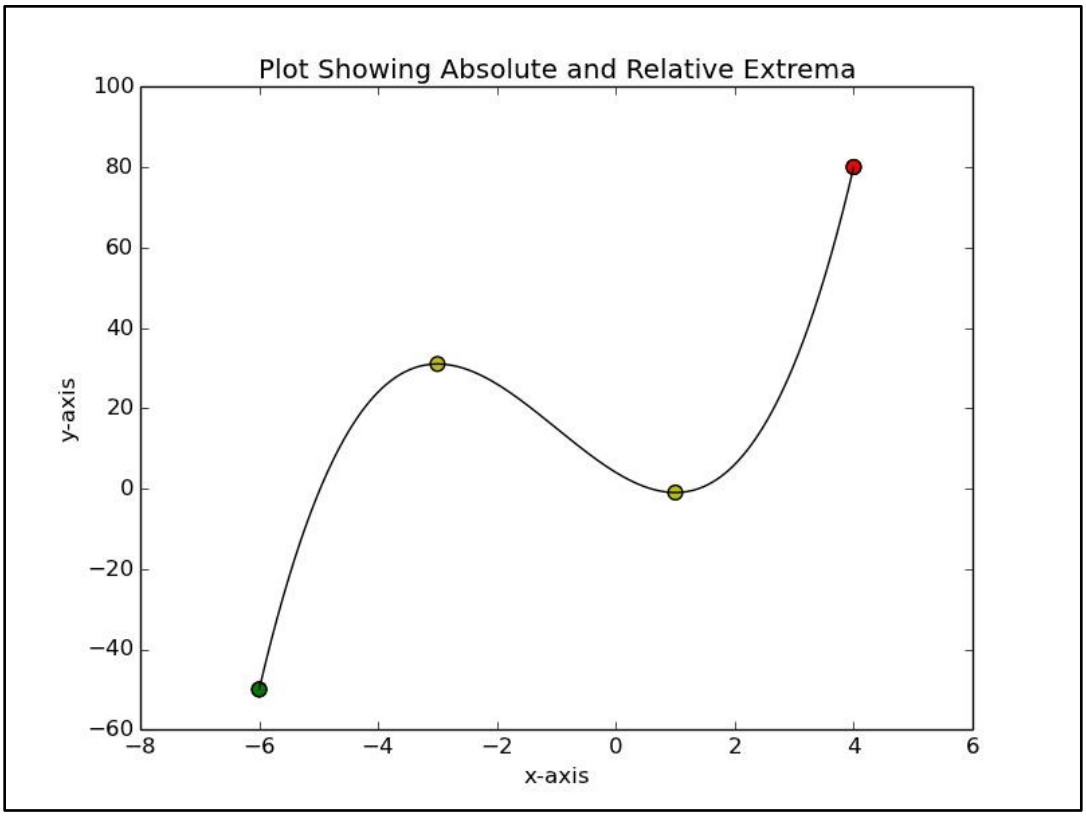
MSPA 400 Session 7 Python Solutions

Module 1

Exercise 1: Refer to Lial Refer to Lial Section 13.1 Example 2. Reproduce Figure 7.

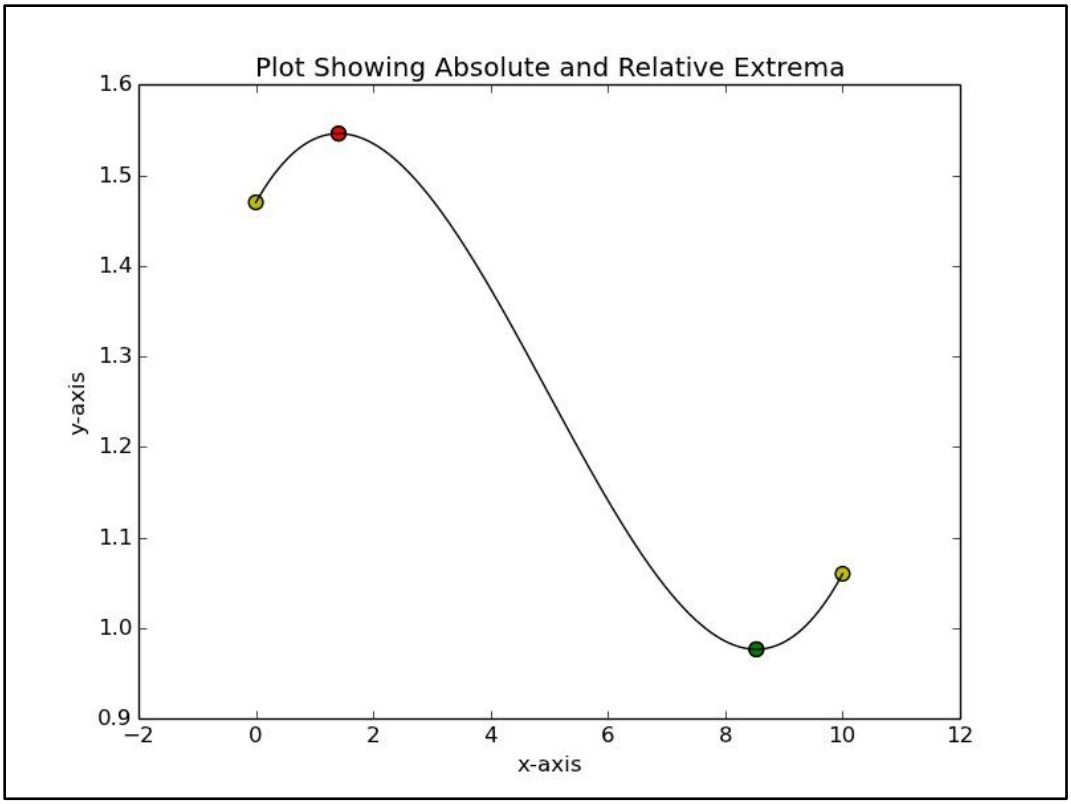
```
plt.figure()
def f(x):
        y= x**3+3.0*x**2-9*x+4.0
        return y
xa= -6.0
xb= +4.0
```



Exercise 2: Refer to Lial Section 14.1 Example 3. Evaluate over the interval [0,10] and produce a plot showing maxima and minima. Compare to the answer sheet.

```
plt.figure()
def f(x):
        y= 0.00316*x**3-0.0471*x**2+0.114*x+1.47
        return y
xa= 0.0
xb= +10.0
```

MSPA 400 Session 7 Python Solutions



Module 2

Exercise: Refer to Lial Section 14.1 Example 2. Duplicate the results showing plots of the function and derivatives. Compare to the answer sheet. (Use the statements below and the same plotting code as shown in the module.)

```
figure()
p=poly1d([3,-4,-12,0,2])
print ('\nFourth Degree Polynomial')
print p
print ('\nFirst Derivative')
g= p.deriv(m=1) # First derivative with m=1.
print g
print ('\nSecond Derivative')
q= p.deriv(m=2) # Second derivative with m=2.
print q
x=linspace(-2,3,101)
y=p(x)
yg=g(x) # These statements define points for plotting.
yq=q(x)
y0=0*x # This statement defines the y axis for plotting.
```

MSPA 400 Session 7 Python Solutions

Note: The notation has been changed from the output for printing in WORD.

Fourth Degree Polynomial

3 x**4 - 4 x**3 - 12 x**2 + 2

First Derivative

12 x**3 - 12 x**2 - 24 x

Second Derivative

36 **2x - 24 x - 24