MSPA 400: Session 7 Python

Reading

Think Python 2nd Edition Chapter 8 (8.3-8.11)

Think Python 3rd Edition Chapter 8 (pages 85-93)

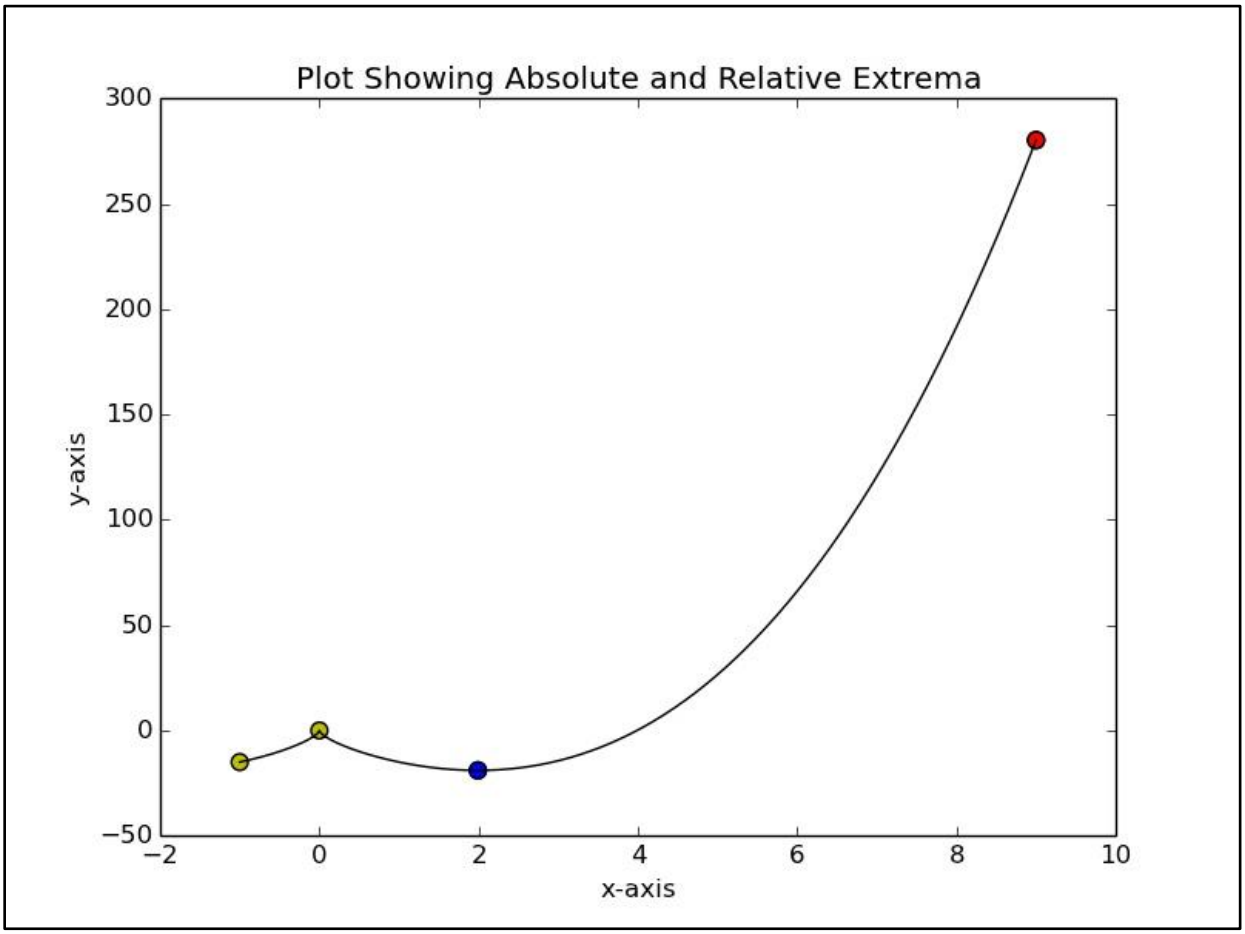
Module 1

(Session 6 Module 1.py)

Objectives:

1. Demonstrate a grid search for maxima and minima of a continuous function.
2. Demonstrate the use of Boolean values with conditionals.
3. Plot the results.

Output from Module 1.py:



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Exercises:

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

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.

   (For practice, define a new function and interval and use the remaining code in the module.)

Module 2

(Session 6 Module 2.py)

Objectives:

1. Demonstrate some of the unique capabilities of numpy and scipy. (Using the poly1d software from numpy, it is possible to differentiate, integrate, and find the roots of polynomials. Plotting the results illustrates the connection between the different functions.)

Output from Module 2.py

(Output and exponents appearing below were edited for printing in WORD.)

Second Degree Polynomial 1 x**2 - 3 x + 2

Fourth Degree Polynomial 2 x**4 + 1 x**3 + 4 x**2 - 2 x + 3

Combination 2 x**6 - 5 x**5 + 5 x**4 - 12 x**3 + 18 x**2 - 16 x + 8

First Derivative 2 x - 3

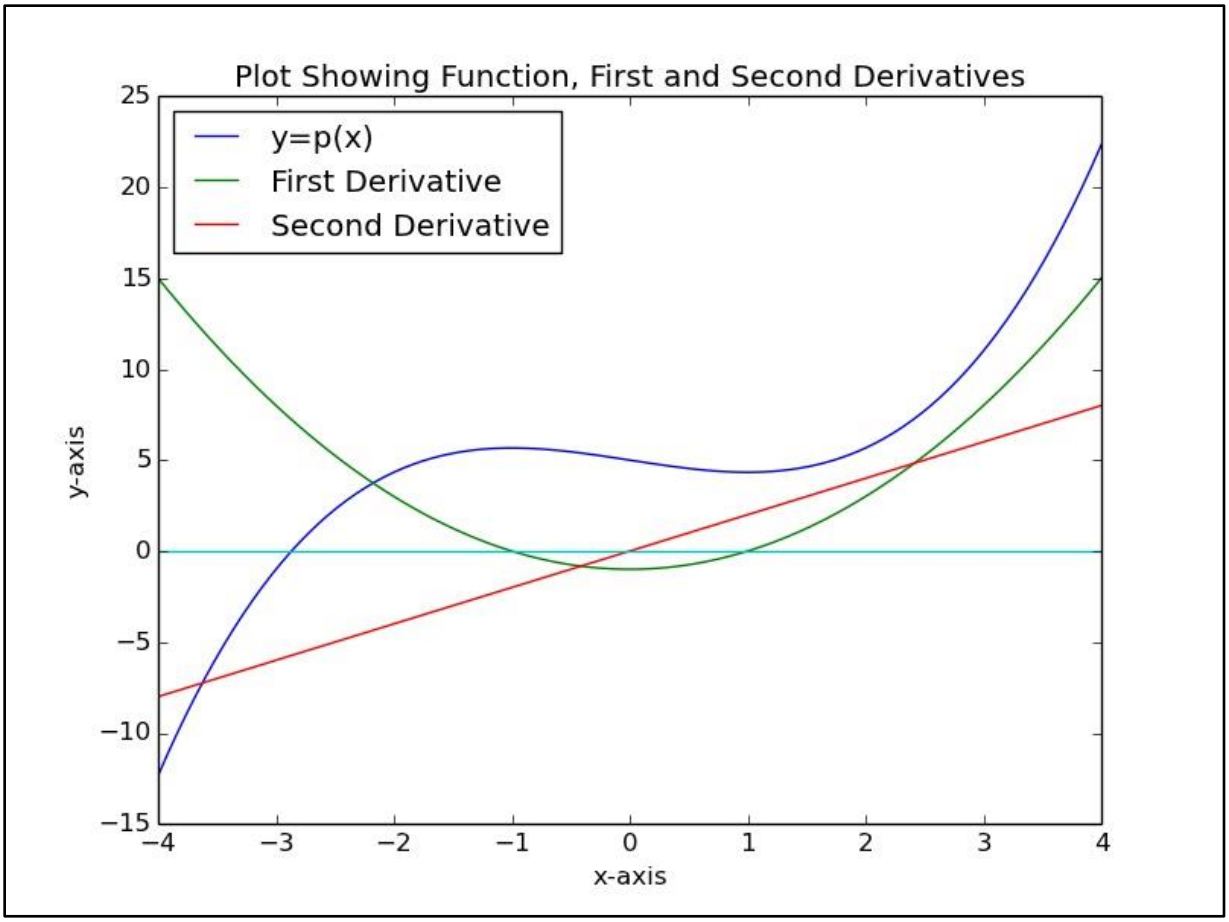
Second Derivative 2

Integrated Derivative
1 x**2 - 3 x + 2
[1. -3. 2.]

Roots of polynomial [2. 1.]

Roots of First Derivative [1.00005 -1.00005]

Roots of Second Derivative [0.]



Exercises:

1. Refer to Lial Section 14.1 Example 2. Duplicate the results showing plots of the function and derivatives. Compare to the answer sheet.