COMP 110 Object-Oriented Programming
Assignment 4 –Numerical Differentiation

Yasin Yılmaz - 041701020 14.04.2019

Algorithm Explanation

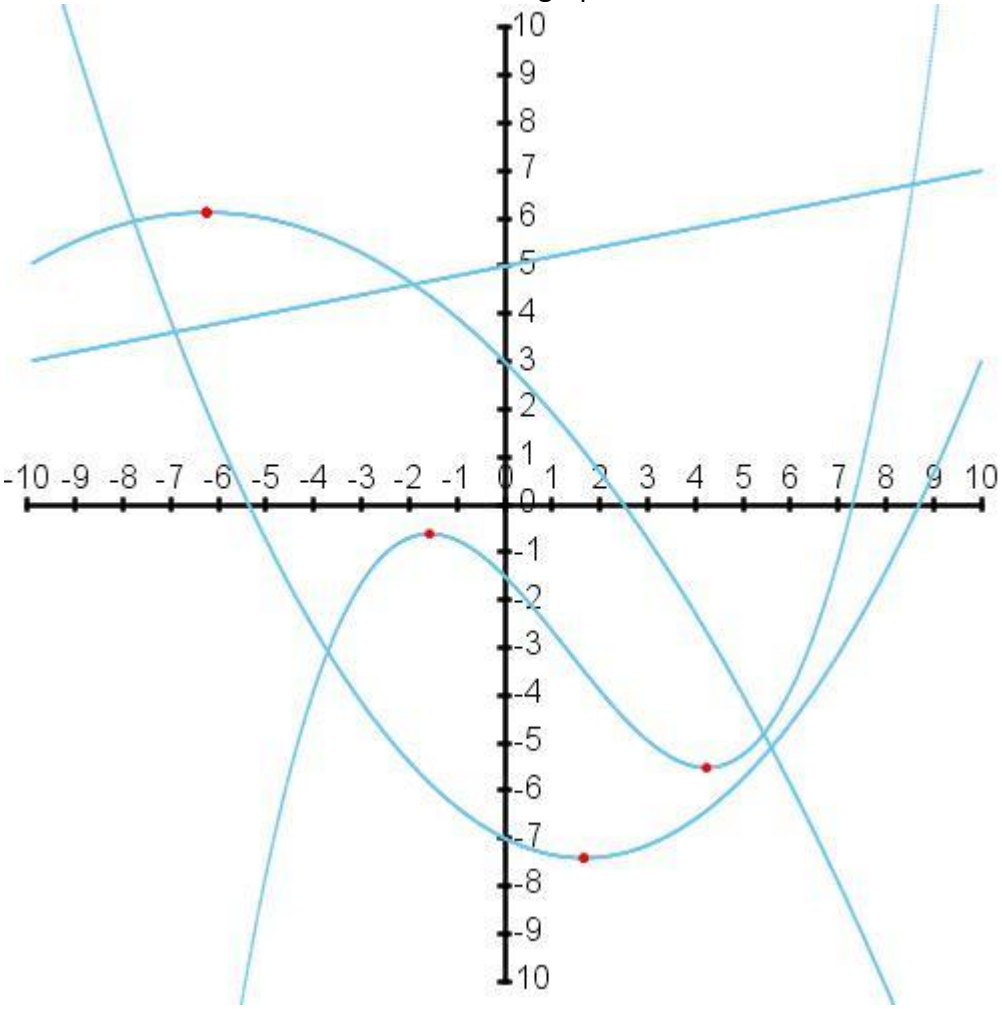
In this assignment, I used a graphics library. this program creates a canvas with a 500X500 mm width and height. It sets the canvas Xscale (-10,10) and Yscale (-10,10) and draws x,y axis Then, it takes datas from a text file. after that, according to input data it creates polynomial objects and adds to an arraylist which contains objects. In a loop it draws graphics for every function And print their informations at the same time After that it calculates their derivatives and print their derivatives' information.

We have 1 superclass and 3 subclass superclass is polynomial and subclasses are polynomial1D, polynomial2D and polynomial3D. Superclass has a several methods one of them is derivative method. This method finds derivatives of functions. After that draw, print and return the zero derivative values.

Subclasses have constructor, evaluate and toString method..Evaluate method computes y value from a,b,c,d values. toString method returns information about function.

Sample Outputs

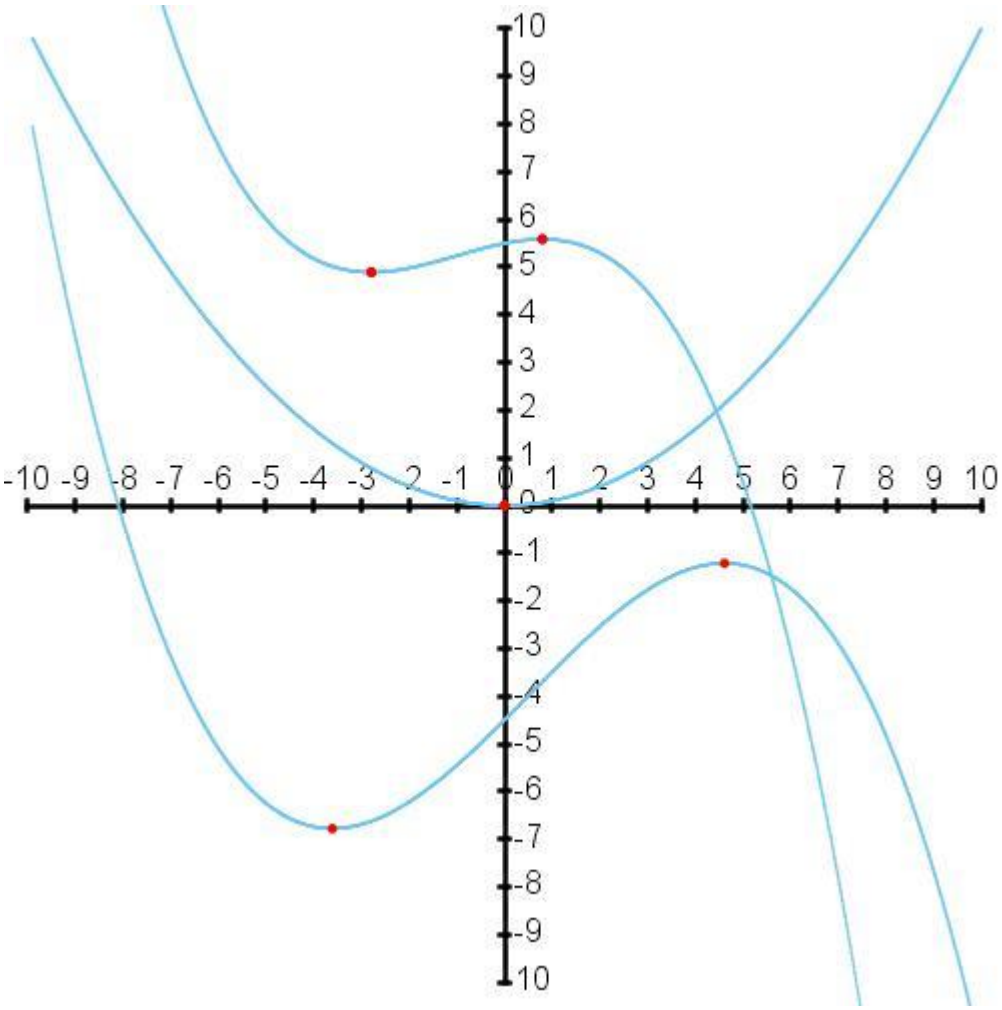
Functions1.txt graphichs



Functions1.txt outputs:

```
Function: (-7.0) + (-0.5)x (0.15)x^2
Points with zero derivatives:
 x: 1,67 y: -7,42

Function: (3.0) + (-1.0)x (-0.08)x^2
Points with zero derivatives:
 x: -6,25 y: 6,12

Function: (-1.5) + (-1.0)x (-0.2)x^2 + (0.05)x^3
Points with zero derivatives:
 x: -1,57 y: -0,62

 x: 4,24 y: -5,52

Function: (5.0) + (0.2)x
It has not zero derivatives
```

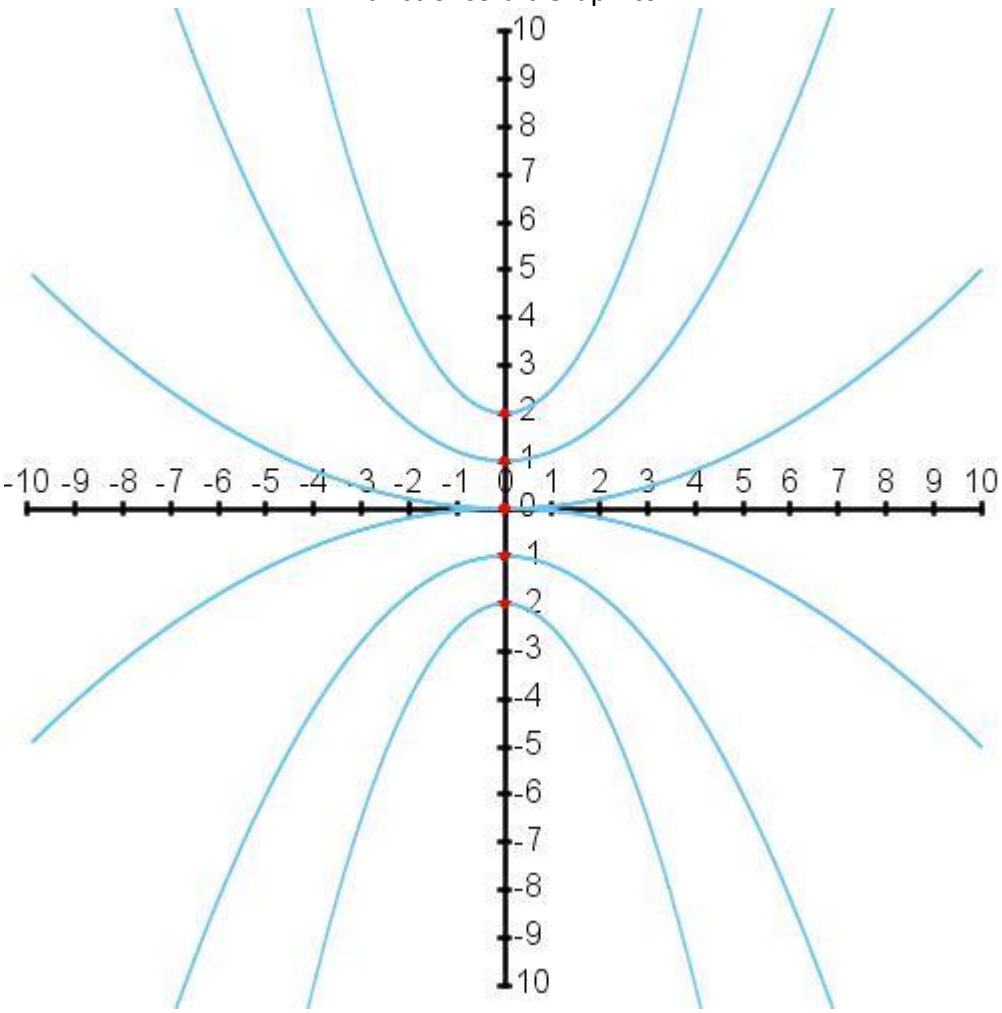
Functions2.txt graphichs



Functions2.txt outputs

```
Function: (-4.5) + (1.0)x (0.03)x^2 + (-0.02)x^3
Points with zero derivatives:
 x: -3,61 y: -6,78

 x: 4,61 y: -1,21

Function: (5.5) + (0.2)x (-0.09)x^2 + (-0.03)x^3
Points with zero derivatives:
 x: -2,80 y: 4,89

 x: 0,80 y: 5,59

Function: (0.0) + (0.0)x (0.1)x^2
Points with zero derivatives:
 x: -0,00 y: 0,00
```

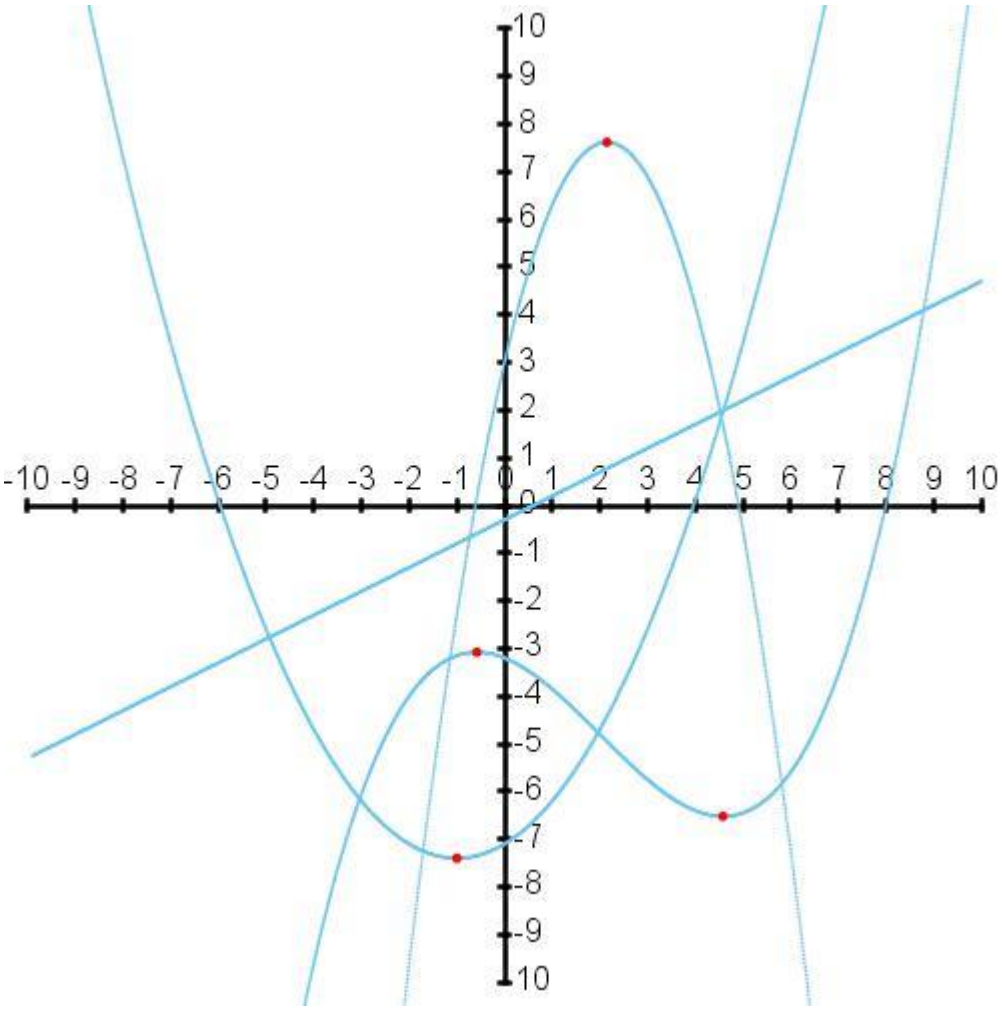
Functions3.txt Graphics



Functions3.txt outputs

```
Function: (2.0) + (0.0)x (0.5)x^2
Points with zero derivatives:
 x: -0,00 y: 2,00

Function: (1.0) + (0.0)x (0.2)x^2
Points with zero derivatives:
 x: -0,00 y: 1,00

Function: (-1.0) + (0.0)x (-0.2)x^2
Points with zero derivatives:
 x: -0,00 y: -1,00

Function: (-2.0) + (0.0)x (-0.5)x^2
Points with zero derivatives:
 x: -0,00 y: -2,00

Function: (0.0) + (0.0)x (0.05)x^2
Points with zero derivatives:
 x: -0,00 y: 0,00

Function: (0.0) + (0.0)x (-0.05)x^2
Points with zero derivatives:
 x: -0,00 y: -0,00
```

Functions4.txt graphics



Functions4.txt outputs

```
Function: (-7.1) + (0.6)x (0.3)x^2
Points with zero derivatives:
 x: -1,00 y: -7,40

Function: (3.0) + (4.3)x (-1.0)x^2
Points with zero derivatives:
 x: 2,15 y: 7,62

Function: (-3.2) + (-0.4)x (-0.3)x^2 + (0.05)x^3
Points with zero derivatives:
 x: -0,58 y: -3,08

 x: 4,58 y: -6,52

Function: (-0.3) + (0.5)x
It has not zero derivatives
```