Object Oriented Modeling and Programming in Engineering

Homework 1

A red sign with white text

Description automatically generated

|  |
| --- |
| **TEACHER:** |
| Mathias Artus |

|  |
| --- |
|  |
| **SUBMITTED BY:**  Cesar Fernando Gamba Tiusaba |
| Registration number |
|  |

1. From an oscillating energy system, you've got the equation for the power:

Whereat:

For this system you want to calculate the energy consumption E(t) for t=20 seconds.

1. UML Diagram

The UML diagram presented in the Figure 1 is used to show and explain the class ***MainClass\_Homework1*** and the methods used to calculate and graph the area of the function using 3 different numerical methods and the analytical function, the class. The C# is called MainClass\_Homework1.

The UML diagram presented in the Figure 2 is used to show and explain the class ***TestFunction***, this class is used to test the class ***MainClass\_Homework1***

A screenshot of a computer program

Description automatically generated

Figure UML MainClass\_Homework1

A screenshot of a computer program

Description automatically generated

Figure UML TestFunction

1. Function plots

* Function plot.

A graph of a function

Description automatically generated

A graph on a grid

Description automatically generated

Figure Function Plot

* Method 1.

A red triangle with white grid and black arrows

Description automatically generated

A graph on a white background

Description automatically generated

Figure Graph method 1

* Method 2.

A green triangle with black arrows

Description automatically generated

A graph on a screen

Description automatically generated

Figure Graph method 2

* Method 3.

A graph of a function

Description automatically generated

A graph with lines and arrows

Description automatically generated with medium confidence

Figure Graph method 3

1. Nassi – Schneiderman Diagrams

Method 1.

A screenshot of a computer program

Description automatically generated

Figure Nassi – Schneiderman Diagrams - Method 1

Method 2.

A screenshot of a computer program

Description automatically generated

Figure Nassi – Schneiderman Diagrams - Method 2

Method 3.

A screenshot of a computer program

Description automatically generated

Figure Nassi – Schneiderman Diagrams - Method 3

1. Results of the numerical and analytical methods.

the manual calculation of this integral is: 635.69

Result method 1 of calculation of the integral is: 632.51155

Result method 2 of calculation of the integral is: 635.626554924185

Result method 3 of calculation of the integral is: 635.626554924185

1. Result absolute error and relative error.

Absolute Error for Method 1 : 3.17844999999977

Relative Error for Method 1 : 0.00502512562814034

Absolute Error for Method 2 : 0.0634450758145704

Relative Error for Method 2 : 9.98150176751785E-05

Absolute Error for Method 3 : 0.0634450758145704

Relative Error for Method 3 : 9.98150176751785E-05