GLG490/598 Numerical methods
Homework #3
Due 11:59pm, 2/11/2021

(100 points)

Question: write a C code to use the Rectangle method and Trapezoid method to determine the integration of:

$$\int_0^1 x^3(1+x^4)^3\,dx$$

Formular for Rectangle method:

$$\int_a^b f(x)dx = h\sum_{i=1}^{n-1} f(x_i + \frac{h}{2})$$

Formular for Trapezoid method:

$$\int_a^b f(x)dx = \frac{h}{2}\sum_{i=1}^{n-1}[f(x_i) + f(x_{i+1})]$$

where n is the number of nodes, and $h = (b-a)/(n-1)$ is the width for each column (or the spacing between 2 neighboring nodes), x_i is the x for the ith node.

Requirements:

1. You need to write **ONE** single code to use both the Rectangle method and the Trapezoid method to calculate the integration.
2. You need to try multiple values of n in the code. The best way is to use n in a 'for loop'. When writing the for loop of n, I use 'for(n=2;n<=4096;n=n*2)'
3. Your code must get exactly the same output as shown below:

```
$ ./a.exe
n=2, Rectangle method:0.149933 Trapezoid method:4.000000
n=4, Rectangle method:0.679730 Trapezoid method:1.515757
n=8, Rectangle method:0.879339 Trapezoid method:1.056432
n=16, Rectangle method:0.924317 Trapezoid method:0.963995
n=32, Rectangle method:0.934387 Trapezoid method:0.943734
n=64, Rectangle method:0.936745 Trapezoid method:0.939011
n=128, Rectangle method:0.937314 Trapezoid method:0.937872
n=256, Rectangle method:0.937454 Trapezoid method:0.937592
n=512, Rectangle method:0.937489 Trapezoid method:0.937523
n=1024, Rectangle method:0.937497 Trapezoid method:0.937506
n=2048, Rectangle method:0.937499 Trapezoid method:0.937501
n=4096, Rectangle method:0.937500 Trapezoid method:0.937500
```

How to submit your homework

1. Name your code as 'FirstName-LastName-HW03.c'
2. Send your code file to Mingming.Li@asu.edu and enter the email subject title as "Numerical Methods Homework 03"