
BLG 202E Homework 4 – Numerical Integration

Assignment Date: 09.05.2017

Due Date: 19.05.2017 23:59

Duration 10 days

- For this homework, prepare an e-report individually and include your written MATLAB code in.
- Submit a .zip archive file that contains your e-report and MATLAB codes through Ninova e-Learning System.
- Plagiarism will not be tolerated.
- No late submissions will be accepted.

Please do not hesitate to contact me for any question.
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1. **The Trapezoidal Rule (30 pt.)** Let $f(x) = 0.2 + 25x + 3x^2$ be a given function.

- (a) Use Trapezoidal Rule to numerically integrate $f(x)$ from $a = 0$ to $b = 2$ and calculate the relative error.
- (b) Use the 2-segment Trapezoidal Rule to numerically integrate $f(x)$ from $a = 0$ to $b = 2$ and calculate the relative error.
- (c) Compare calculated relative errors in (a) and (b), and explain the result in your own words.

2. **The Simpson's Rule (40 pt.)**

- (a) Show in detail how to obtain the Simpson rule

$$\int_a^b f(x)dx \approx \frac{b-a}{6} \left[f(a) + 4f\left(\frac{a+b}{2}\right) + f(b) \right]$$

- (b) Use composite Simpson's 1/3 rule to integrate $f(x) = 0.2 + 25x + 3x^2 + 2x^4$ from $a=0$ to $b=2$ for $r=4$ (four equal panels).

3. **The Matlab Application (30 pt.)** Write a matlab program that computes an integral numerically, using the composite Trapezoidal, Mid-point and Simpson methods. Input for the program consists of the integrand, the ends of the integration interval, and the number of (uniform) subintervals. Apply your program to the two following integrals:

(a)

$$\int_0^1 \frac{4}{1+x^2} dx$$

(b)

$$\int_0^1 \sqrt{x} dx$$