AERE 361 Lab 7 Report

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1 Exercise 1: Midpoint Rule

- The big O notation is O(n), which means execution is proportionally linear to input
- Explanation: The steps it takes to execute grows at the same pace as the size of the input value
- Equation:

$$\int_a^b f(x)dx = (b-a)(f(a+b)/2)$$

2 Exercise 2: Simpson's 1/3

- The big O notation is O(n), which means execution is proportionally linear to input
- Explanation: The steps it takes to execute grows at the same pace as the size of the input value
- Equation:

$$\int_a^b f(x)dx = ((b-a)/6)[f(a) + 4f((a+b)/2) + f(b)]$$

3 Exercise 3: Simpson's 3/8

- The big O notation is O(n), which means execution is proportionally linear to input
- Explanation: The steps it takes to execute grows at the same pace as the size of the input value
- Equation:

$$\int_a^b f(x)dx = ((b-a)/8)[f(a) + 3f((2a+b)/3) + 3f((a+2b)/3) + f(b)]$$

4 Exercise 4: Gauss Quad

- The big O notation is $O(n^2)$, which means execution is proportionally quadratic to input
- Explanation: The code Gauss Quad formula includes a for loop which causes the execution steps to grow proportionally to the the input squared
- Equation:

$$\int_a^b f(x)dx = m\sum_{i=1}^{n}((w_i)(f(c+mt_i)))$$

5 Sources

5.1 Course Material:

- Lab 7 Manual
- Lecture Notes

5.2 Online Sources:

- `https://valgrind.org/info/` : via lab manual
- `medium.com/algorithm-time-complexity-and-big-o-notation` : via lab manual