

Project 02

APSC 607 Fall 2017

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1 Introduction

This project explored methods for calculating the integral roots of functions. Each functions was examined in the range between zero and two, using the Composite Trapezoidal Rule, Composite Midpoint Rule, Composite Simpson's Rule, as well as an adaptive implementation of the Composite Simpson's Rule. The behavior and characteristics of these methods are reviewed by examining the effectiveness of the resulting value for the integral given a range of values for N.

All computations were performed using MATLAB using the code (Table 1) accompanying this report (in a zip file). The following Methods section will present the methods used in MATLAB to explore functions, as well as the outputs and results. The Results section of this report contains the outputs for each function and range along with related observations and discussion. All figures and tables found in this report are available in the output subdirectory of the accompanying zip file. Additionally, all code and figures found in the zip file can be accessed via GitHub¹.

Some text[1].

$$f(x) = e^{2x} * \sin(3x) \quad (1)$$

$$f(x) = \frac{1}{x + 4} \quad (2)$$

cool Figure 1

2 Methods

2.1 Trapezoidal

Here, explain the concept of a 2-DEG in GaAs/AlGaAs. What is a 2-DEG and why does it arise?

¹https://github.com/sgoodm/apsc607/tree/master/project_02

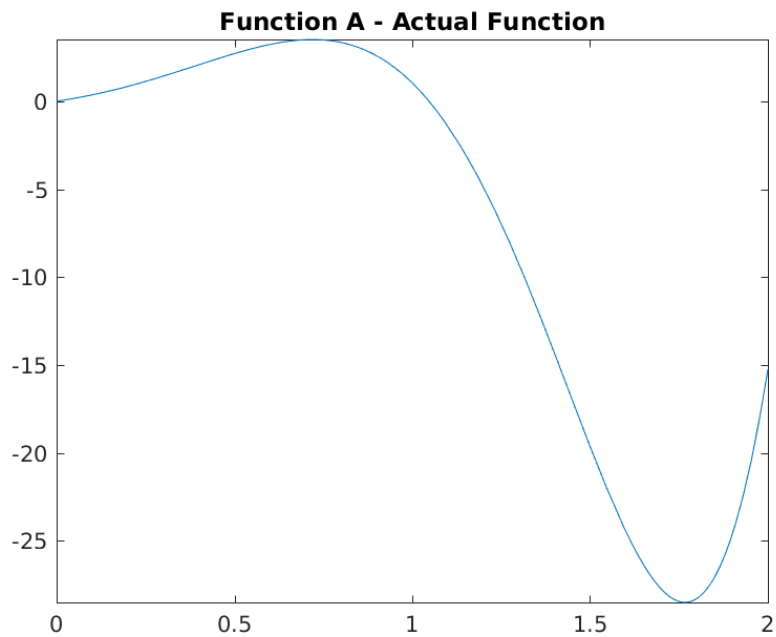


Figure 1: caption text

2.2 Midpoint

Explain the classical Hall effect in your own words. What do I measure at $B = 0$? And what happens if $B > 0$? Which effect gives rise to the voltage drop in the vertical direction?

2.3 Simpson's

Explain the IQHE in your own words. What does the density of states look like in a 2-DEG when $B = 0$? What are Landau levels and how do they arise? What are edge states? What does the electron transport look like when you change the magnetic field? What do you expect to measure?

2.4 Adaptive Simpson's

Explain the IQHE in your own words. What does the density of states look like in a 2-DEG when $B = 0$? What are Landau levels and how do they arise? What are edge states? What does the electron transport look like when you change the magnetic field? What do you expect to measure?

Item	Quantity
Widgets	42
Gadgets	13

Table 1: An example table.

3 Results

3.1 How to Make Tables

Use the table and tabular commands for basic tables — see Table 1, for example.

3.2 How to Write Mathematics

L^AT_EX is great at typesetting mathematics. Let X_1, X_2, \dots, X_n be a sequence of independent and identically distributed random variables with $E[X_i] = \mu$ and $\text{Var}[X_i] = \sigma^2 < \infty$, and let

$$S_n = \frac{X_1 + X_2 + \dots + X_n}{n} = \frac{1}{n} \sum_i^n X_i \quad (3)$$

denote their mean. Then as n approaches infinity, the random variables $\sqrt{n}(S_n - \mu)$ converge in distribution to a normal $\mathcal{N}(0, \sigma^2)$.

The equation 3 is very nice.

3.3 How to Make Sections and Subsections

Use section and subsection commands to organize your document. L^AT_EX handles all the formatting and numbering automatically. Use ref and label commands for cross-references.

3.4 How to Make Lists

You can make lists with automatic numbering ...

1. Like this,
2. and like this.

...or bullet points ...

- Like this,
- and like this.

...or with words and descriptions ...

Word Definition

Concept Explanation

Idea Text

We hope you find writeL^AT_EX useful, and please let us know if you have any feedback using the help menu above.

References

- [1] Burden, R., Faires, J., Numerical Analysis 9th Edition. 2010