

MATH 3503 - Winter 2025

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Preface

These notes are for the Winter 2025 term of the course MATH 3503 at the University of New Brunswick. These notes will cover more advanced calculus topics for engineers.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

1 Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

2 First Order ODEs

2.1 Introduction

This is some text

2.2 Variable-Separable/Linear

And this is some more

2.3 Exact/Homogeneous

2.4 Bernoulli

3 Second Order ODEs

3.1 Homogeneous with Constant Coefficients

3.2 Examples and the Initial Value Problem

3.3 Non-homogeneous Differential Equations with Constant Coefficients

3.4 Variation of Parameters

3.5 Applications

4 Systems of ODEs

4.1 Fundamentals and Examples

4.2 Physical Examples

4.3 Ideas and Notation

4.4 Eigenvalue Method Examples

4.5 Complex Eigenvalues

4.6 Vector Fields

4.7 Second Order Systems

4.8 Repeated Eigenvalues

4.9 Matrix Exponentials

4.10 Non-homogeneous Equations

5 Fourier Series

5.1 Boundary Value Problem

5.2 Orthogonality of Eigenfunctions

5.3 Eigenfunction Decomposition and Trigonometric Series

5.4 Sawtooth and Square Wave Examples

5.5 More Series

6 Laplace Transforms

6.1 Introduction

6.2 Examples

6.3 Inverse Laplace Transform

6.4 Solving Homogeneous ODEs

6.5 Solving Non-homogeneous ODEs

6.6 Unit Step Function

6.7 More Transforms of ODEs

6.8 Convolution

6.9 Impulse Functions

7 Summary

In summary, this book has no content whatsoever.

References

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. <https://doi.org/10.1093/comjnl/27.2.97>.

