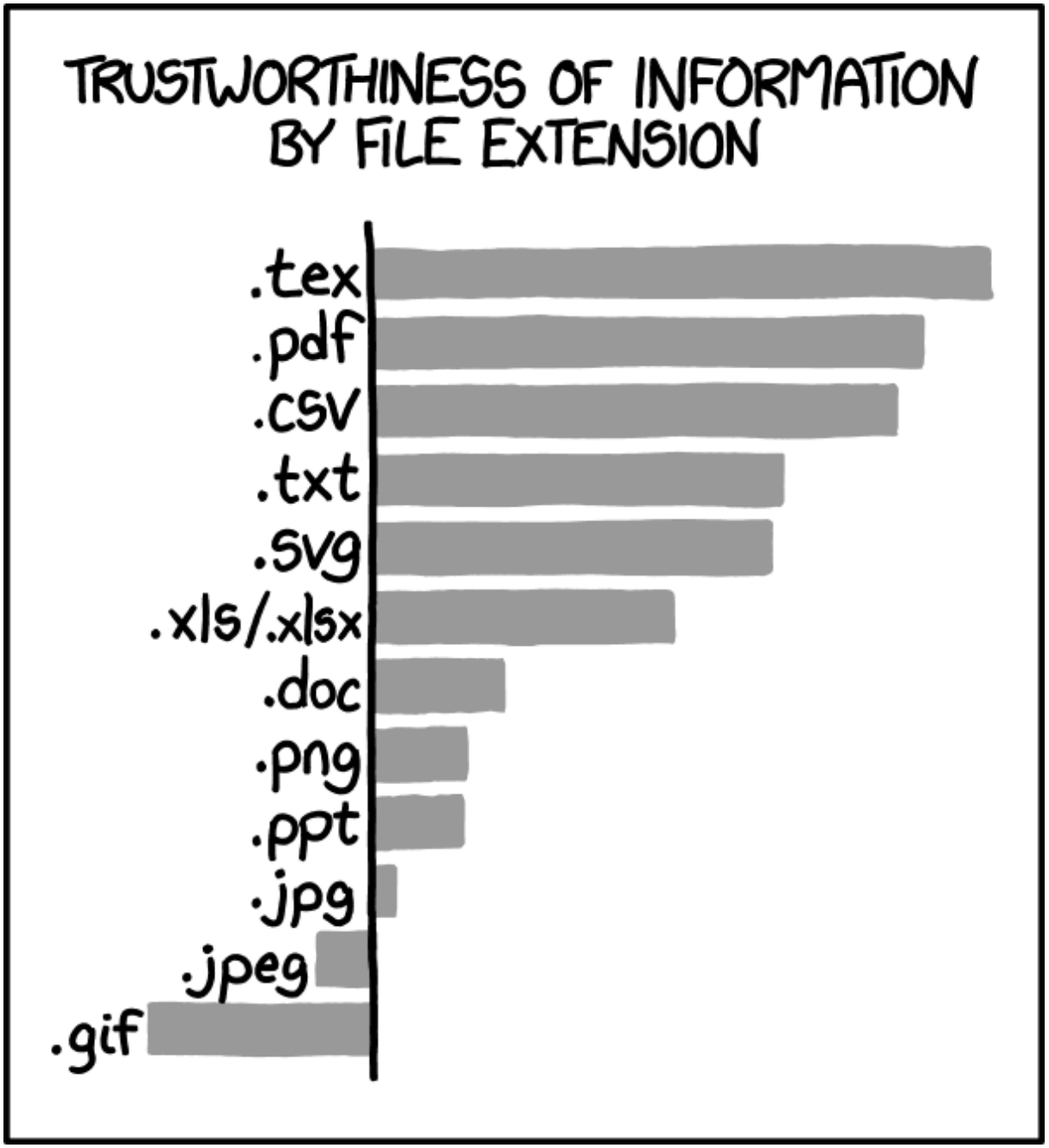
MATH3430: DIFFERENTIAL EQUATIONS

ADITHYA BHASKARA
PROFESSOR: SHEAGAN JOHN

TEXTBOOK: MARTIN BRAUN

UNIVERSITY OF COLORADO BOULDER

Draft: January 15, 2023



Draft: January 15, 2023

Contents

Preface iii

1 First Order Differential Equations 1

2 Second Order Differential Equations 2

3 Systems of Differential Equations 3

4 Qualitative Theory of Differential Equations 4

Differential Equations as a Word Cloud 5

Draft: January 15, 2023

Preface

To the interested reader,

This document is a compilation of lecture notes taken during the Spring 2023 semester for MATH3430: Ordinary Differential Equations at the University of Colorado Boulder. The course used *Differential Equations and Their Applications*[1] by Martin Braun as its primary text. As such, many theorems, definitions, and content may be quoted from the book. This course was taught by Sheagan John, Ph. D.

The author would like to provide the following resources for students currently taking a differential equations course:

1. MIT OpenCourseWare Differential Equations Lectures From Spring 2006.
2. 3Blue1Brown's *Overview of Differential Equations*.

While much effort has been put in to remove typos and mathematical errors, it is very likely that some errors, both small and large, are present. Please keep in mind that the author wrote this resource during his second semester of his undergraduate studies. If an error needs to be resolved, please contact Adithya Bhaskara at adithya.bhaskara@colorado.edu.

Finally, the author would like to dedicate this set of lecture notes to *Aidan Janney*, *Erika Sjöblom*, and *Tate McDonald*, three of the author's closest friends who plan to take Differential Equations in the upcoming semester; Fall 2023, at the time of writing.

Best Regards,
Adithya Bhaskara

Draft: January 15, 2023

REVISED: January 15, 2023

[1] Braun, M. (1993). *Differential Equations and Their Applications: An Introduction to Applied Mathematics* (4th ed.). Springer.

1

First Order Differential Equations

Draft: January 15, 2023

2

Second Order Differential Equations

Draft: January 15, 2023

3

Systems of Differential Equations

Draft: January 15, 2023

4

Qualitative Theory of Differential Equations

Draft: January 15, 2023

Draft: January 15, 2023