


 Beginning of Jan. 15, 2021
 

1 Introduction

Big picture of MATH 501: *use computers to solve math problems.*

- (1) Linear equations, differentiation, integration, differential equations, etc.
- (2) **Approximation & optimization.**

Definition 1.1

Continuous vs. Discrete:

	Continuous (real world)	Discrete (computers)
Examples	Numbers in \mathbb{Q} , \mathbb{R} , \mathbb{C} , etc. (Never-ending decimals)	Integers; floating-point numbers
Differentiation	$f'(x) := \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$	Difference quotient: compute the fraction with a given Δx ; the smaller Δx is the more accurate the <i>approximation</i> is.
Continuous functions	$\sin x, e^x$, etc.	Discrete function approximations (pairs of $\{x, f(x)\}$ evaluated at specific values on the domain)