OnRamps PreCalculus Notes

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OnRamps Precalculus works through a dual-enrollment model with the University of Texas at Austin. Through a creative and connected approach, students deepen and extend their knowledge of functions, graphs, and equations from their high school Algebra and Geometry courses so that they can successfully work with the concepts in a rigorous university-level calculus course. This course is designed to push students well beyond "drill and kill" exercises, emphasizing conceptual understanding of mathematical definitions and developing logical arguments with peers.

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1 Functions, Rates, and Patterns

- 1.1 What is a Function?
- 1.2 Functions and Types of Functions
- 1.3 A Qualitative Look at Rates
- 1.4 Sequences and Triangular Differences
- 1.5 Functions Defined by Patterns

2 Algebra and Geometry

- 2.1 Algebra and Geometry
- 2.2 Complex Geometry and Roots
- 2.3 Conic Sections
- 2.4 Using Matrices to Find Models
- 2.5 Using Statistical Regression to Fit a Function to Bivariate Data

3 Exponentials and Logarithms

- 3.1 Exponent Properties
- 3.2 A Special Number
- 3.3 The Natural Logarithm Function as the Inverse of e^x
- 3.4 Growth and Decay
- 3.5 Using Functions Defined by Patterns in Application

4 Trigonometry

- 4.1 Working with Identities
- 4.2 Trigonometric Foundations
- 4.3 The Trigonometric Functions Off the Unit Circle
- 4.4 Angular and Linear Speed
- 4.5 Back to Identities
- 4.6 The Roller Coaster

5 Limits and Rates of Change of Functions

- 5.1 First, Some Background Rational Functions
- 5.2 Limits
- 5.3 Approximating Rates of Change
- 5.4 The Derivative

6 Other Coordinate Systems

- 6.1 A Nonstandard Exploration of the Rate of Change of Functions
- 6.2 More Information Needed
- 6.3 Applications of Parametric Equations
- 6.4 Vectors
- 6.5 The Golf Shot
- 6.6 The Polar Coordinate System
- 6.7 Classic Polar Relations
- **6.8 Complex Numbers**