Functions, Models, and Concepts of Calculus

Chapter 1  From Counting to Calculus
– Counting and number notation
– Modeling the real-world
– Modeling motion
Exercises

Chapter 2  Equations and Variables
– Solving for an unknown
– Cardano and variables
– Viete and Formulas
Exercises

Chapter 3  Coordinates and Graphs
– Descartes and the coordinate plane
– Visualizing equations in two variables
– Solving equations graphically
Exercises

Chapter 4  Lines
– Slope and rate of change
– Equations of lines
– Lines in the real world: regression
Exercises

Chapter 5  Functions
– The concept of function as a rule
– Graph of a function
– Getting information from the graph of a function
– Combining functions
– Rules that undo each other
– Modeling with functions
Exercises

Chapter 6  Rate of Change of a function
– Average rate of change
– Rates of change in the real world
– Do we need instantaneous rate of change?
Exercises
Chapter 7  Limits and the Derivative

– Limits and instantaneous rate of change
– The derivative
– The derivative as a function
– The meaning of the derivative
– Differentiation rules

Exercises

Chapter 8  Applications of the Derivative

– What \( f' \) tells us about \( f \)
– Maximum and minimum problems
– Antiderivatives
– Differential equations

Exercises

Chapter 9  Area and Integral

– What is area?
– Area under the graph of a function
– Using limits of find area

Exercises

Chapter 10  The Fundamental Theorem of Calculus

– Integrals and Antidervatives
– The Fundamental Theorem of Calculus
– Evaluating integrals using the Fundamental Theorem
– The meaning of the integral

Exercises