

1 Algebra

1. Linear Functions: Graph them, solve them, and write them given two points or one point and the slope.
2. Quadratic Functions: Solve any quadratic function, find the vertex, graph them.
3. Function Notation: Manipulate function notation, understand function composition.
4. Function Inverses: Find the inverse of a function.

2 Rates of Change

1. Average Rate of Change: compute it, understand what it means in various contexts (ex. average speed).
2. instantaneous Rate of Change - The Derivative: Know the definition, compute it from the definition, understand what it means in various contexts (speed, acceleration), understand the difference between instantaneous RoC and average RoC.

3 Limits

1. Limits: evaluate limits by first canceling factors, recognize that not all limits exist
2. Continuity: know the definition of continuity, determine if a given function is continuous at a given point.
3. Differentiability: know the definition, determine if a function is differentiable at a given point.

4 Derivatives

1. Definition (again, was also in chapter 2)
2. Compute derivatives from the definition for x^n , $\frac{1}{x^n}$, \sqrt{x} , and combinations thereof.

5 Differentiation Rules

1. Power Rule
2. Additive and scalar multiple properties of differentiation
3. Product Rule
4. Quotient Rule
5. Chain Rule

6 Extrema

1. Definitions of minima and maxima, local minima and maxima
2. Find absolute and relative extrema of a function, possibly on a given interval.
3. understand the relationship between derivatives and the shape of a graph: increasing, decreasing, concavity.

7 Optimization and Related Rates

1. Maximize or minimize a geometric quantity from a word problem
2. Find the $\frac{dy}{dt}$ given $\frac{dx}{dt}$ and information about x and y relate to each other.

8 Integrals

1. Definition
2. Approximate with Riemann Sums
3. Evaluate exactly with geometry (triangles, rectangles, trapezoids, semicircles)

9 Computing Integrals the hard way

1. Σ -notation
2. Evaluating summations: two formulas, and two properties
3. Evaluating limits of rational functions
4. Evaluating limits of Sums

10 Computing Integrals the easy way

1. The Fundamental Theorem of Calculus: memorize it, and be able to apply both parts
2. Evaluate indefinite integrals/Anitderivatives of polynomials and functions that “look like polynomials”.
3. Evaluate definite integrals of polynomials and polynomial look alike
4. Evaluate other (in)definite integrals with “ u -substitution”