**Final Review**

**Unit 1: Limits and Their Properties**

1. **Finding Limits Graphically and Numerically**
	1. Limits that fail to exist
	2. Limits using a table
	3. Limits using a graph
2. **Evaluating Limits Analytically**
	1. Properties of Limits
	2. Simplifying with Algebra
	3. Rationalizing techniques
3. **Continuity and One-Sided Limits**
	1. Intermediate Value Theorem
4. **Infinite Limits**
	1. Vertical Asymptotes
5. **Limits at Infinity**
	1. Horizontal Asymptotes
	2. Dividing every term by the greatest power of the denominator

**Unit 2: Differentiation**

1. **The Derivative and the Tangent Line Problem**
	1. Limit definition for finding the derivative
	2. Alternate form of the derivative
	3. Slope of the tangent line
2. **Basic Differentiation Rules and Rates of Change**
	1. Constant Rule
	2. Power Rule
	3. Constant multiple rule
	4. Sum and Difference rule
	5. Rate of change (Average Velocity =)
	6. s(t)

v(t)=s’(t)

a(t)=v’(t)=s’’(t)

1. **Product and Quotient Rules and Higher-Order Derivatives**
	1. Product rule
	2. Quotient Rule
	3. Second and Nth Derivative
2. **The Chain Rule**
	1. Chain rule
	2. Simplifying derivatives to use the rules
3. **Implicit Differentiation**
4. **Related Rates**

**Unit 3: Applications of Differentiation**

1. **Extrema on an Interval**
	1. Maximum and Minimum
2. **Rolle's Theorem and the Mean Value Theorem**
	1. Rolle’s theorem : if f(a)=f(b) , Then there is at least one point that also has a slope of 0.
	2. Mean Value Theorem: , there is a tangent line with the same slope of the secant line.
3. **Increasing and Decreasing Functions and the First Derivative Test**
	1. First Derivative test: Max/Min : f’(x)=0
4. **Concavity and Second Derivative Test**
	1. Second derivative test : Point of inflection : f’’(x)=0
5. **A Summary of Curve Sketching**
	1. Concavity, Increasing/Decreasing, Intercepts, Max/Min, Points of inflection, & Asymptotes
6. **Differentials**
	1. Maximum Volume /length/Area

**Unit 4: Integration**

1. **Antiderivatives and Indefinite Integration**
	1. Basic integration rules: Power rule, Constant rule, Trig.
	2. General solutions: F(x) **+C**
	3. Particular solutions: (x,y) or when x=#
2. **Area**
	1. Sigma Notation
	2. Left side /Right side Rectangle Sum
	3. Limit definition
3. **Riemann Sums and Definite Integrals**
	1. Properties of definite integrals
4. **The Fundamental Theorem of Calculus**
	1. Average Value Theorem for integrals ,
	2. Second fundamental theorem of Calculus,
	3. Net Change Theorem,
5. **Integration by Substitution**
	1. U-Substitution

**Unit 5: Logarithmic, Exponential, and Other Transcendental Functions**

1. **The Natural Logarithmic Function: Differentiation and Integration**
2. **Inverse Trigonometric Functions: Differentiation  and Integration**
3. **Exponential Functions: Differentiation and Integration**
4. **Chain Rule with Natural Log and Exponential Functions**
5. **Bases Other than e and Applications Derivatives and Integrals**

**Unit 6: Differential Equations**

1. **Slope Fields**
2. **Differential Equations**
	1. Differentials
	2. Growth and Decay
3. **Separation of Variables and Logistic Equations**

**Unit 7: Applications of Integration**

1. **Area of a Region Between Two Curves**
2. **Volume: The Disk and Washer Method**
3. **Arc Length**
4. **Surfaces of Revolution**

**Extra Topics**

 **L’Hospitals Rule**