Name: _____ Date: _____ Period: _____ 2020

AP Calculus – **Units Covered** – **AP Calculus BC School Year 2019-2020 (Covid-19)**

Unit 1 – Limits and Continuity

- 1.1 – Introducing Calculus: Can Change Occur at an Instant?
- 1.2 – Defining Limits and Using Limit Notation
- 1.3 – Estimating Limit Values from Graphs
- 1.4 – Estimating Limit Values from Tables
- 1.5 – Determining Limits Using Algebraic Properties of Limits
- 1.6 – Determining Limits Using Algebraic Manipulation
- 1.7 – Selecting Procedures for Determining Limits
- 1.8 – Determining Limits Using the Squeeze Theorem (Sandwich Theorem)
- 1.9 – Connecting Multiple Representations of Limits
- 1.10 – Exploring Types of Discontinuities
- 1.11 – Defining Continuity at a Point
- 1.12 – Confirming Continuity over an Interval
- 1.13 – Removing Discontinuities
- 1.14 – Connecting Infinite Limits and Vertical Asymptotes
- 1.15 – Connecting Limits at Infinity and Horizontal Asymptotes
- 1.16 – Working with the Intermediate Value Theorem (IVT)

Unit 2 – Differentiation: Definition and Basic Derivative Rules

- 2.1 – Defining Average and Instantaneous Rate of Change at a Point
- 2.2 – Defining the Derivative of a Function and Using Derivative Notation
- 2.3 – Estimating Derivatives of a Function at a Point
- 2.4 – Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist
- 2.5 – Applying the Power Rule
- 2.6 – Derivative Rules: Constant, Sum, Difference, and Constant Multiple
- 2.7 – Derivatives of $\cos x$, $\sin x$, e^x, and $\ln x$
- 2.8 – The Product Rule
- 2.9 – The Quotient Rule
- 2.10 – Finding the Derivatives of Tangent, Cotangent, Secant, and/or Cosecant Functions

Unit 3 – Differentiation: Composite, Implicit, and Inverse Functions

- 3.1 – The Chain Rule
- 3.2 – Implicit Differentiation
- 3.3 – Differentiating Inverse Functions
- 3.4 – Differentiating Inverse Trigonometric Functions
- 3.5 – Selecting Procedures for Calculating Derivatives
- 3.6 – Calculating Higher-Order Derivatives

Unit 4 – Contextual Applications of Differentiation

- 4.1 – Interpreting the Meaning of the Derivative in Context
- 4.2 – Straight-Line Motion: Connecting Position, Velocity, and Acceleration
- 4.3 – Rates of Change in Applied Contexts Other Than Motion
- 4.4 – Introduction to Related Rates
- 4.5 – Solving Related Rates Problems
- 4.6 – Approximating Values of a Function Using Local Linearity and Linearization

4.7 – Using L'Hospitals' Rule for Determining Limits of Indeterminate Forms

Unit 5 – Analytical Applications of Differentiation

5.1 – Using the Mean Value Theorem
5.2 – Extreme Value Theorem, Global versus Local Extrema, and Critical Points
5.3 – Determining Intervals of Which a Function Is Increasing or Decreasaing
5.4 – Use the First Derivative Tet to Determine Relative (Local) Extrema
5.5 – Using the Candidates Test to Determine Absolute (Global) Extrema
5.6 – Determining Concavity of Functions over Their Domains
5.7 – Using the Second Derivative Test to Determine Extrema
5.8 – Sketching Graphs of Functions and Their Derivatives
5.9 – Connecting a Function, Its First Derivative, and Its Second Derivative
5.10 – Introduction to Optimization Problems
5.11 – Solving Optimization Problems
5.12 – Exploring Behaviors of Implict Relations

Unit 6 – Integration and Accumulation of Change

6.1 – Exploring Accumulations of Change
6.2 – Approximating Areas with Riemann Sums
6.3 – Riemann Sums, Summation Notation, and Definite Integral Notation
6.4 – The Fundamental Theorem of Calculus and Accumulation Functions
6.5 – Interpreting the Behavior of Accumulation Functions Involving Area
6.6 – Applying Properties of Definite Integrals
6.7 – The Fundamental Theorem of Calculus and Definite Integrals
6.8 – Finding Antiderivatives and Indefinite Integrals (Basic Rules and Notation)
6.9 – Integrating Using Substitution
6.10 – Integrating Functions Using Long Division and Completing the Square
6.11**(BC)** – Integrating Using Integration by Parts
6.12**(BC)** – Using Linear Partial Fractions
6.13**(BC)** – Evaluating Improper Integrals
6.14 – Selecting Techniques for Antidifferentiation

Unit 7 – Differential Equations

7.1 – Modeling Siuations with Differential Equations
7.2 – Verify Solutions for Differential Equations
7.3 – Sketching Slope Fields
7.4 – Reasoning Using Slope Fields
7.5**(BC)** – Approximating Solutions Using Euler's Method
7.6 – Finding General Solutions Using Separation of Variables
7.7 – Finding Particular Solutions Using Initial Conditions and Separation of Variables
7.8 – Exponential Models with Differential Equations
7.9**(BC)** – Logistic Models with Differential Equations

Unit 8 – Application of Integration

8.1 – Finding the Average Value of a Function on the Interval
8.2 – Connecting Position, Velocity, and Acceleration of Functions Using Integrals

8.3 – Using Accumulation Functions and Definite Integrals in Applied Contexts

8.4 – Finding the Area Between Curves Expressed as Functions of x

8.5 – Finding the Area Between Curves Expressed as Functions of y

8.6 – Finding the Area Between Curves That Intersect at More Than Two Points

8.7 – Volumes with Cross Sections (Squares and Rectangles)

8.8 – Volumes with Cross Sections (Triangles and Semicircles)

8.9 – Volume with Disc Method (Revolving Around the x- or y-Axis)

8.10 – Volume with Disc Method (Revolving Around Other Axes)

8.11 – Volume with Washer Method (Revolving Around the x- or y-Axis)

8.12 – Volume with Washed Method (Revolving Around Other Axes)

8.13**(BC)** – The Arc Length of a Smooth, Planar Curve and Distance Traveled

Unit 9 (BC) – Parametric Equations, Polar Coordinates, and Vector-Valued Functions

9.1 – Defining and Differentiating Parametric Equations

9.2 – Second Derivatives of Parametric Equations

9.3 – Finding Arc Lengths of Curves Given by Parametric Equations

9.4 – ~~Defining and Differentiating Vector-Valued Functions~~

9.5 – ~~Integrating Vector-Valued Functions~~

9.6 – ~~Solving Motion Problems Using Parametric and Vector-Valued Functions~~

9.7 – ~~Defining Polar Coordinates and Differentiating in Polar Form~~

9.8 – ~~Find the Area of a Polar Region or the Area Bounded by a Single Polar Curve~~

9.9 – ~~Finding the Area of the Region Bounded by Two Polar Curves~~

Unit 10 (BC) – Infinite Sequences and Series

10.1 – Defining Convergent and Divergent Infinite Series

10.2 – Working with Geometric Series

10.3 – ~~The nth Term Test for Divergence~~

10.4 – ~~Integral Test for Convergence~~

10.5 – ~~Harmonic Series and p-Series~~

10.6 – ~~Comparison Tests for Convergence~~

10.7 – ~~Alternating Series Test for Convergence~~

10.8 – ~~Ratio Test for Convergence~~

10.9 – ~~Determining Absolute or Conditional Convergence~~

10.10 – ~~Alternating Series Error Bound~~

10.11 – ~~Finding Taylor Polynomial Approximations of Functions~~

10.12 – ~~Lagrange Error Bound~~

10.13 – ~~Radius and Interval of Convergence of Power Series~~

10.14 – ~~Finding Taylor or Maclaurin Series for a Function~~

10.15 – ~~Representing Functions as Power Series~~