Calculus 12 Outcomes

A1 Apply, understand, and explain average and instantaneous rates of change and extend these concepts to secant line and tangent line slopes.
A2 Demonstrate an understanding of the definition of the derivative.
A3 Demonstrate an understanding of implicit differentiation and identify situations that require implicit differentiation.
B1 Calculate and interpret average and instantaneous rate of change.
B2 Calculate limits for function values and apply the properties with and without technology.
B3 Remove removable discontinuities by extending or modifying a function.
B4 Apply the properties of algebraic combinations and composites of continuous functions.
B5 Find where a function is not differentiable and distinguish between corners, cusps, discontinuities, and vertical tangents.
B6 Derive, apply, and explain power, sum, difference, product and quotient rules.
B7 Apply the chain rule to composite functions.
B8 Use derivatives to analyze and solve problems involving rates of change.
B9 Apply the rules for differentiating the six trigonometric functions.
B11 Calculate and apply derivatives of exponential and logarithmic functions.
B13 Estimate the change in a function using differentials and apply them to real world situations.
B14 Solve and interpret related rate problems.
B15 Demonstrate an understanding of critical points and absolute extreme values of a function.
B16 Find the intervals on which a function is increasing or decreasing.
B17 Solve application problems involving maximum or minimum values of a function.
B18 Apply rules for definite integrals.
B19 Apply the Fundamental Theorem of Calculus.

B20 Compute indefinite and definite integrals by the method of substitution.
B21 (Optional) Apply integration by parts to evaluate indefinite and definite integrals.
B22 Solve problems in which a rate is integrated to find the net change over time.
C1 Identify the intervals upon which a given function is continuous and understand the meaning of a continuous function.
C2 Understand the development of the slope of a tangent line from the slope of a secant line.
C3 Find the equations of the tangent and normal lines at a given point.
C4 Demonstrate an understanding of the connection between the graphs of *f* and *f'*.
C5 Apply the First and Second Derivative Tests to determine the local extreme values of a function.
C6 Determine the concavity of a function and locate the points of inflection by analyzing the second derivative.
C7 Solve initial value problems of the form $dy/dx = f(x)$, $y_0 = f(x_0)$, where $f(x)$ is a function that students recognize as a derivative.
C8 Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
C9 Construct antiderivatives using the Fundamental Theorem of Calculus.
C10 Find antiderivatives of polynomials, e^{kx}, and selected trigonometric functions of *kx.*
D1 Apply and understand how Riemann's sum can be used to determine the area under a polynomial curve.
D2 Demonstrate an understanding of the meaning of area under the curve.
D3 Express the area under the curve as a definite integral.
D4 Compute the area under the curve using numerical integration procedures.
D5 Apply integration to calculate areas of regions in a plane.
D6 (Optional) Apply integration (by slices or shells) to calculate volumes.