

A Correlation of

**MyMathLab® for School
Calculus
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MyMathLab® for School

to the

**Advanced Placement
Calculus AB/BC Standards
Bid Category 13-100-40
Grades 9–12**

ALWAYS LEARNING

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Advanced Placement Calculus AB/BC Standards	MyMathLab® for School, Calculus AP Edition, ©2016
I Functions, Graphs, and Limits	
I.AB. Analysis of graphs. With the aid of technology, graphs of functions are often easy to produce. The emphasis is on the interplay between the geometric and analytic information and on the use of calculus both to predict and to explain the observed local and global behavior of a function.	SE/TE: Sections 4.1-4.3
I.AB. Limits of functions (including one-sided limits).	
<ul style="list-style-type: none"> An intuitive understanding of the limiting process. 	SE/TE: Sections 2.1, 2.2
<ul style="list-style-type: none"> Calculating limits using algebra. 	SE/TE: Section 2.3
<ul style="list-style-type: none"> Estimating limits from graphs or tables of data. 	SE/TE: Section 2.2
I.AB. Asymptotic and unbounded behavior	
<ul style="list-style-type: none"> Understanding asymptotes in terms of graphical behavior 	SE/TE: Sections 2.4, 2.5
<ul style="list-style-type: none"> Describing asymptotic behavior in terms of limits involving infinity 	SE/TE: Sections 2.4, 2.5
<ul style="list-style-type: none"> Comparing relative magnitudes of functions and their rates of change. (For example, contrasting exponential growth, polynomial growth, and logarithmic growth) 	SE/TE: Sections 2.5, 4.7, 9.2
I.AB. Continuity as a property of functions	
<ul style="list-style-type: none"> An intuitive understanding of continuity. (The function values can be made as close as desired by taking sufficiently close values of the domain. 	SE/TE: Section 2.6
<ul style="list-style-type: none"> Understanding continuity in terms of limits 	SE/TE: Section 2.6
<ul style="list-style-type: none"> Geometric understanding of graphs of continuous functions (Intermediate Value Theorem and Extreme Value Theorem) 	SE/TE: Sections 2.6, 4.1

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I.BC. Parametric, polar, and vector functions. The analysis of planar curves includes those given in parametric form, polar form, and vector form	SE/TE: Sections 11.1–11.6
II. Derivatives	
II.AB. Concept of the derivative	
<ul style="list-style-type: none"> • Derivative presented graphically, numerically, and analytically 	SE/TE: Sections 3.1, 3.2
<ul style="list-style-type: none"> • Derivative interpreted as an instantaneous rate of change 	SE/TE: Sections 2.1, 3.1, 3.6, 3.11
<ul style="list-style-type: none"> • Derivative defined as the limit of the different quotient 	SE/TE: Section 3.1
<ul style="list-style-type: none"> • Relationship between differentiability and continuity 	SE/TE: Section 3.2
II.AB. Derivative at a point	
<ul style="list-style-type: none"> • Slope of a curve at a point. Examples are emphasized, including points at which there are vertical tangents and points at which there are no tangents. 	SE/TE: Section 3.1
<ul style="list-style-type: none"> • Tangent line to a curve at a point and local linear approximation 	SE/TE: Sections 3.1, 4.5
<ul style="list-style-type: none"> • Instantaneous rate of change as the limit of average rate of change 	SE/TE: Sections 2.1, 3.6
<ul style="list-style-type: none"> • Approximate rate of change from graphs and tables of values 	SE/TE: Sections 2.1, 3.1
II.AB. Derivative as a function	
<ul style="list-style-type: none"> • Corresponding characteristics of graphs of f and f' 	SE/TE: Section 3.2
<ul style="list-style-type: none"> • Relationship between the increasing and decreasing behavior of f and the sign of f' 	SE/TE: Section 4.2
<ul style="list-style-type: none"> • The Mean Value Theorem and its geometric consequences 	SE/TE: Section 4.6

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<ul style="list-style-type: none"> Equations involving derivatives. Verbal descriptions are translated into equations involving derivatives and vice versa 	SE/TE: Sections 3.6, 3.11
II.AB. Second derivatives	
<ul style="list-style-type: none"> Corresponding characteristics of the graphs of f, f', and f'' 	SE/TE: Section 4.2
<ul style="list-style-type: none"> Relationship between the concavity of f and the sign of f'' 	SE/TE: Sections 4.2, 4.3
<ul style="list-style-type: none"> Points of inflection as places where concavity changes 	SE/TE: Section 4.2
II.AB. Applications of derivatives	
<ul style="list-style-type: none"> Analysis of curves, including the notions of monotonicity and concavity 	SE/TE: Sections 4.1–4.3
<ul style="list-style-type: none"> Analysis of planar curves given in parametric form, polar form, and vector form, including velocity and acceleration vectors. (Calculus BC) 	SE/TE: Sections 11.1–11.7
<ul style="list-style-type: none"> Optimization, both absolute (global) and relative (local) extrema 	SE/TE: Sections 4.1–4.4
<ul style="list-style-type: none"> Modeling rates of change, including related rates problems 	SE/TE: Sections 3.6, 3.11
<ul style="list-style-type: none"> Use of implicit differentiation to find the derivative of an inverse function. 	SE/TE: Sections 3.8–3.10
<ul style="list-style-type: none"> Interpretation of the derivative as a rate of change in varied applied contexts, including velocity, speed, and acceleration 	SE/TE: Sections 3.6, 3.11
<ul style="list-style-type: none"> Geometric interpretation of differential equations via slope fields and the relationship between slope fields and solution curves for differential equations 	SE/TE: Section 8.2

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<ul style="list-style-type: none"> Numerical solution of differential equations using Euler’s method (Calculus BC) 	SE/TE: Section 8.2
<ul style="list-style-type: none"> L’Hôpital’s Rule, including its use in determining limits and convergence of improper integrals and series. (Calculus BC) 	SE/TE: Sections 4.7, 7.4, 9.2
II.AB. Computation of derivatives	
<ul style="list-style-type: none"> Knowledge of derivatives of basic functions, including power, exponential, logarithmic, trigonometric, and inverse trigonometric functions 	SE/TE: Sections 3.3, 3.5, 3.4, 3.10
<ul style="list-style-type: none"> Derivative rules for sums, products, and quotients of functions. 	SE/TE: Sections 3.3, 3.4
<ul style="list-style-type: none"> Chain rule and implicit differentiation 	SE/TE: Sections 3.7, 3.8
<ul style="list-style-type: none"> Derivatives of parametric, polar, and vector functions (Calculus BC) 	SE/TE: Sections 11.2, 11.4, 11.6
III. Integrals	
III.AB. Interpretations and properties of definite integrals	
<ul style="list-style-type: none"> Definite integral as a limit of Riemann sums 	SE/TE: Section 5.3
<ul style="list-style-type: none"> Definite integral of the rate of change of a quantity over an interval interpreted as the change of the quantity over the interval: $\int_a^b f'(x)dx = f(b) - f(a)$ 	SE/TE: Sections 5.4, 6.1
<ul style="list-style-type: none"> Basic properties of definite integrals. (Examples include additivity and linearity.) 	SE/TE: Section 5.5

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<p>Applications of integrals. Appropriate integrals are used in a variety of applications to model physical, biological or economic situations. Although only a sampling of applications can be included in any specific course, students should be able to adapt their knowledge and techniques to solve other similar application problems. Whatever applications are chosen, the emphasis is on using the method of setting up an approximating Riemann sum and representing its limit as a definite integral. To provide a common foundation, specific applications should include finding the area of a region, the volume of a solid with known cross sections, the average value of a function, the distance traveled by a particle along a line, and accumulated change from a rate of change</p>	<p>SE/TE: Section 5.5, Chapter 6</p>
<p>III.BC Applications of integrals. Appropriate integrals are used in a variety of applications to model physical, biological or economic situations. Although only a sampling of applications can be included in any specific course, students should be able to adapt their knowledge and techniques to solve other similar application problems. Whatever applications are chosen, the emphasis is on using the method of setting up an approximating Riemann sum and representing its limit as a definite integral. To provide a common foundation, specific applications should include finding the area of a region (including a region bounded by polar curves), the volume of a solid with known cross sections, the average value of a function, the distance traveled by a particle along a line, the length of a curve (including a curve given in parametric form), and accumulated change from a rate of change.</p>	<p>SE/TE: Sections 7.2, 7.3</p>
<p>III.AB. Fundamental Theorem of Calculus</p>	
<ul style="list-style-type: none"> • Use of the Fundamental Theorem to evaluate definite integrals 	<p>SE/TE: Section 5.4</p>

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<ul style="list-style-type: none"> Use of the Fundamental Theorem to represent a particular antiderivative, and the analytical and graphical analysis of functions so defined. 	SE/TE: Sections 5.4, 6.1
III.AB. Techniques of antidifferentiation	
<ul style="list-style-type: none"> Antiderivatives following directly from derivatives of basic functions 	SE/TE: Section 5.6
<ul style="list-style-type: none"> Antiderivatives by substitution of variables (including change of limits for definite integrals) 	SE/TE: Section 7.2
<ul style="list-style-type: none"> Antiderivatives by substitution of variables (including change of limits for definite integrals) parts, and simple partial fractions (nonrepeating linear factors only) (Calculus BC) 	SE/TE: Section 7.3
<ul style="list-style-type: none"> Improper integrals (as limits of definite integrals) (Calculus BC) 	SE/TE: Section 7.2
III.AB. Applications of antidifferentiation	
<ul style="list-style-type: none"> Finding specific antiderivatives using initial conditions, including applications to motion along a line 	SE/TE: Sections 5.1, 6.1, 8.1
<ul style="list-style-type: none"> Solving separable differential equations and using them in modeling. In particular, studying the equation $y' = ky$ and exponential growth. 	SE/TE: Sections 8.3, 8.4
<ul style="list-style-type: none"> Solving logistic differential equations and using them in modeling (Calculus BC) 	SE/TE: Sections 8.1–8.3
Numerical approximation to definite integrals. Use of Riemann sums (using left, right and midpoint evaluation points) and trapezoid sums to approximate definite integrals of functions represented algebraically, graphically, and by tables of values.	SE/TE: Sections 5.1, 5.2, 5.7

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IV.BC. Polynomial Approximations and Series	
IV.BC. Concept of series. A series is defined as a sequence of partial sums, and convergence is defined in terms of the limit of the sequence of partial sums. Technology can be used to explore convergence or divergence	SE/TE: Sections 9.1, 9.3
IV.BC. Series of constants	
<ul style="list-style-type: none"> Motivating examples, including decimal expansion 	SE/TE: Sections 9.1, 9.3
<ul style="list-style-type: none"> Geometric series with applications 	SE/TE: Section 9.3
<ul style="list-style-type: none"> The harmonic series 	SE/TE: Section 9.4
<ul style="list-style-type: none"> Alternating series with error bound 	SE/TE: Section 9.6
<ul style="list-style-type: none"> Terms of series as areas of rectangles and their relationship to improper integrals, including the integral test and its use in testing the convergence of p- series. 	SE/TE: Section 9.4
<ul style="list-style-type: none"> The ratio test for convergence and divergence 	SE/TE: Section 9.5
<ul style="list-style-type: none"> Comparing series to test for convergence or divergence 	SE/TE: Section 9.5
IV.BC. Taylor series	
<ul style="list-style-type: none"> Taylor polynomial approximation with graphical demonstration of convergence. (For example, viewing graphs of various Taylor polynomials of the sine function approximating the sine curve.) 	SE/TE: Section 10.1
<ul style="list-style-type: none"> Maclaurin series and the general Taylor series centered at $x = a$ 	SE/TE: Section 10.3
<ul style="list-style-type: none"> Maclaurin series for the functions e^x, $\sin x$, $\cos x$, and $\frac{1}{1-x}$ 	SE/TE: Sections 10.2, 10.3
<ul style="list-style-type: none"> Formal manipulation of Taylor series and shortcuts to computing Taylor series, including substitution, differentiation, antidifferentiation, and the formation of new series from known series 	SE/TE: Sections 10.2–10.4

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• Functions defined by power series	SE/TE: Sections 10.2–10.4
• Radius and interval of convergence of power series	SE/TE: Section 10.2
• Lagrange error bound for Taylor polynomials	SE/TE: Section 10.3