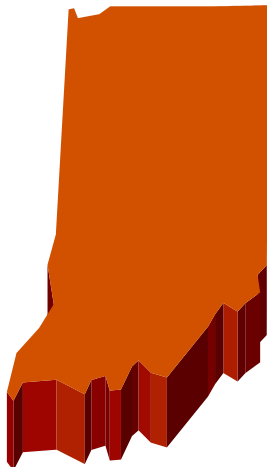
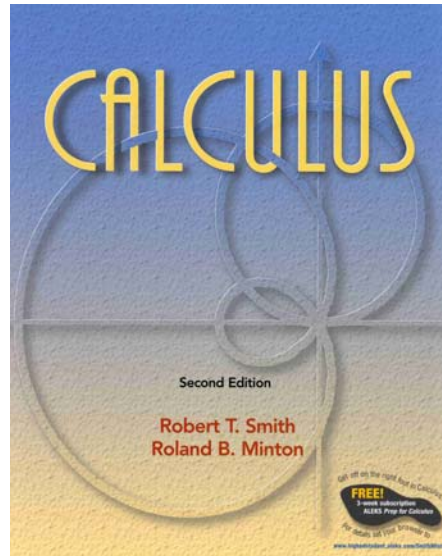


# Glencoe/McGraw-Hill

Calculus ©2002

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alignment to

**Indiana  
Academic Mathematics Standards  
Calculus**

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**ALIGNMENT TO**

**INDIANA  
ACADEMIC MATHEMATICS STANDARDS FOR CALCULUS**

OBJECTIVES	PAGE REFERENCES
<b>Limits and Continuity</b>	
Students understand the concept of limit, find limits of functions at points and at infinity, decide if a function is continuous, and use continuity theorems.	
<ul style="list-style-type: none"> <li>• Understand the concept of limit and estimate limits from graphs and tables of values.</li> </ul>	PE: 82–88, 114–121, 129–131, 138–143
<ul style="list-style-type: none"> <li>• Find limits by substitution.</li> </ul>	PE: 91–95
<ul style="list-style-type: none"> <li>• Find limits of sums, differences, products, and quotients.</li> </ul>	PE: 83–85, 92–97
<ul style="list-style-type: none"> <li>• Find limits of rational functions that are undefined at a point.</li> </ul>	PE: 82–88, 93–94, 114–121
<ul style="list-style-type: none"> <li>• Find one-sided limits.</li> </ul>	PE: 83–88, 99, 114–117
<ul style="list-style-type: none"> <li>• Find limits at infinity.</li> </ul>	PE: 117–121, 133–134, 137–143
<ul style="list-style-type: none"> <li>• Decide when a limit is infinite and use limits involving infinity to describe asymptotic behavior.</li> </ul>	PE: 82–86, 114–117
<ul style="list-style-type: none"> <li>• Find special limits such as <math>\lim_{x \rightarrow 0} \frac{\sin x}{x}</math>.</li> </ul>	PE: 86, 196–200
<ul style="list-style-type: none"> <li>• Understand continuity in terms of limits.</li> </ul>	PE: 102–111
<ul style="list-style-type: none"> <li>• Decide if a function is continuous at a point.</li> </ul>	PE: 102–108
<ul style="list-style-type: none"> <li>• Find the types of discontinuities of a function.</li> </ul>	PE: 102–104
<ul style="list-style-type: none"> <li>• Understand and use the Intermediate Value Theorem on a function over a closed interval.</li> </ul>	PE: 108–111
<ul style="list-style-type: none"> <li>• Understand and apply the Extreme Value Theorem: If <math>f(x)</math> is continuous over a closed interval, then <math>f</math> has a maximum and a minimum on the interval.</li> </ul>	PE: 258–267

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<b>OBJECTIVES</b>	<b>PAGE REFERENCES</b>
<b>Differential Calculus</b>	
Students find derivatives of algebraic, trigonometric, logarithmic, and exponential functions. They find derivatives of sums, products, and quotients, and composite and inverse functions. They find derivatives of higher order, and use logarithmic differentiation and the Mean Value Theorem.	
<ul style="list-style-type: none"> <li>• Understand the concept of derivative geometrically, numerically, and analytically, and interpret the derivative as a rate of change.</li> </ul>	PE: 149–160, 164–172
<ul style="list-style-type: none"> <li>• State, understand, and apply the definition of derivative.</li> </ul>	PE: 153—160, 164–172
<ul style="list-style-type: none"> <li>• Find the derivatives of functions, including algebraic, trigonometric, logarithmic, and exponential functions.</li> </ul>	PE: 176–218, 480–485, 495–500
<ul style="list-style-type: none"> <li>• Find the derivatives of sums, products, and quotients.</li> </ul>	PE: 176–183, 187–194
<ul style="list-style-type: none"> <li>• Find the derivatives of composite functions, using the chain rule.</li> </ul>	PE: 213–219
<ul style="list-style-type: none"> <li>• Find the derivatives of implicitly-defined functions.</li> </ul>	PE: 220–229
<ul style="list-style-type: none"> <li>• Find derivatives of inverse functions.</li> </ul>	PE: 487–494, 536–539
<ul style="list-style-type: none"> <li>• Find second derivatives and derivatives of higher order.</li> </ul>	PE: 182–185
<ul style="list-style-type: none"> <li>• Find derivatives using logarithmic differentiation.</li> </ul>	PE: 209–212, 481—485
<ul style="list-style-type: none"> <li>• Understand and use the relationship between differentiability and continuity.</li> </ul>	PE: 170–171
<ul style="list-style-type: none"> <li>• Understand and apply the Mean Value Theorem.</li> </ul>	PE: 229–237

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OBJECTIVES	PAGE REFERENCES
<b>Applications of Derivatives</b>	
Students find slopes and tangents, maximum and minimum points, and points of inflection. They solve optimization problems and find rates of change.	
<ul style="list-style-type: none"> <li>• Find the slope of a curve at a point, including points at which there are vertical tangents and no tangents.</li> </ul>	PE: 150–161, 176–177, 181, 283
<ul style="list-style-type: none"> <li>• Find a tangent line to a curve at a point and a local linear approximation.</li> </ul>	PE: 242–247
<ul style="list-style-type: none"> <li>• Decide where functions are decreasing and increasing. Understand the relationship between the increasing and decreasing behavior of <math>f</math> and the sign of <math>f'</math>.</li> </ul>	PE: 269–277, 286–297
<ul style="list-style-type: none"> <li>• Find local and absolute maximum and minimum points.</li> </ul>	PE: 258–268, 271–276, 281–297
<ul style="list-style-type: none"> <li>• Analyze curves, including the notions of monotonicity and concavity.</li> </ul>	PE: 271–297
<ul style="list-style-type: none"> <li>• Find points of inflection of functions. Understand the relationship between the concavity of <math>f</math> and the sign of <math>f''</math>. Understand points of inflection as places where concavity changes.</li> </ul>	PE: 278–297
<ul style="list-style-type: none"> <li>• Use first and second derivatives to help sketch graphs. Compare the corresponding characteristics of the graphs of <math>f</math>, <math>f'</math>, and <math>f''</math>.</li> </ul>	PE: 278–297
<ul style="list-style-type: none"> <li>• Use implicit differentiation to find the derivative of an inverse function.</li> </ul>	PE: 491–492
<ul style="list-style-type: none"> <li>• Solve optimization problems.</li> </ul>	PE: 298–309, 979–1004
<ul style="list-style-type: none"> <li>• Find average and instantaneous rates of change. Understand the instantaneous rate of change as the limit of the average rate of change. Interpret a derivative as a rate of change in applications, including velocity, speed, and acceleration.</li> </ul>	PE: 154–163, 183–186, 310–318, 442–452

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<b>OBJECTIVES</b>	<b>PAGE REFERENCES</b>
<ul style="list-style-type: none"> <li>Find the velocity and acceleration of a particle moving in a straight line.</li> </ul>	PE: 154–161, 183–184, 442—452
<ul style="list-style-type: none"> <li>Model rates of change, including related rates problems.</li> </ul>	PE: 158–159, 225–229, 310—318
<b>Integral Calculus</b>	
Students define integrals using Riemann Sums, use the Fundamental Theorem of Calculus to find integrals, and use basic properties of integrals. They integrate by substitution and find approximate integrals.	
<ul style="list-style-type: none"> <li>Use rectangle approximations to find approximate values of integrals.</li> </ul>	PE: 342–350
<ul style="list-style-type: none"> <li>Calculate the values of Riemann Sums over equal subdivisions using left, right, and midpoint evaluation points.</li> </ul>	PE: 343–355
<ul style="list-style-type: none"> <li>Interpret a definite integral as a limit of Riemann Sums.</li> </ul>	PE: 350–357
<ul style="list-style-type: none"> <li>Understand the Fundamental Theorem of Calculus: Interpret a definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval, that is <math>\int_a^b f'(x)dx = f(b) - f(a)</math>.</li> </ul>	PE: 364–374
<ul style="list-style-type: none"> <li>Use the Fundamental Theorem of Calculus to evaluate definite and indefinite integrals and to represent particular antiderivatives. Perform analytical and graphical analysis of functions so defined.</li> </ul>	PE: 322—333, 367–374, 480—485

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<b>OBJECTIVES</b>	<b>PAGE REFERENCES</b>
<ul style="list-style-type: none"> <li>• Understand and use these properties of definite integrals:  <math display="block">\int_a^b [f(x) + g(x)]dx = \int_a^b f(x)dx + \int_a^b g(x)dx</math> <math display="block">\int_a^b k \cdot f(x)dx = k \int_a^b f(x)dx</math> <math display="block">\int_a^a f(x)dx = 0</math> <math display="block">\int_a^b f(x)dx = - \int_b^a f(x)dx</math> <math display="block">\int_a^b f(x)dx + \int_b^c f(x)dx = \int_a^c f(x)dx</math> <p>If <math>f(x) \leq g(x)</math> on <math>[a, b]</math>, then <math>\int_a^b f(x)dx \leq</math>  <math>\int_a^b g(x)dx.</math></p> </li> </ul>	PE: 356–363
<ul style="list-style-type: none"> <li>• Understand and use integration by substitution (or change of variable) to find values of integrals.</li> </ul>	PE: 374–383
<ul style="list-style-type: none"> <li>• Understand and use Riemann Sums, the Trapezoidal Rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, and by tables of values.</li> </ul>	PE: 347–350, 384–398

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OBJECTIVES	PAGE REFERENCES
<b>Applications of Integration</b>	
Students find velocity functions and position functions from their derivatives, solve separable differential equations, and use definite integrals to find areas and volumes.	
<ul style="list-style-type: none"> <li>• Find specific antiderivatives using initial conditions, including finding velocity functions from acceleration functions, finding position functions from velocity functions, and applications to motion along a line.</li> </ul>	PE: 322–331, 442–452
<ul style="list-style-type: none"> <li>• Solve separable differential equations and use them in modeling.</li> </ul>	PE: 503–520
<ul style="list-style-type: none"> <li>• Solve differential equations of the form <math>y' = ky</math> as applied to growth and decay problems.</li> </ul>	PE: 503—511, 516–520
<ul style="list-style-type: none"> <li>• Use definite integrals to find the area between a curve and the <math>x</math>-axis, or between two curves.</li> </ul>	PE: 345–348, 350—358, 402–410
<ul style="list-style-type: none"> <li>• Use definite integrals to find the average value of a function over a closed interval.</li> </ul>	PE: 358–363
<ul style="list-style-type: none"> <li>• Use definite integrals to find the volume of a solid with known cross-sectional area.</li> </ul>	PE: 411–433
<ul style="list-style-type: none"> <li>• Apply integration to model and solve problems in physics, biology, economics, etc., using the integral as a rate of change to give accumulated change and using the method of setting up an approximating Riemann Sum and representing its limit as a definite integral.</li> </ul>	PE: 322–323, 355–356, 434–441, 442–464, 465—475

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