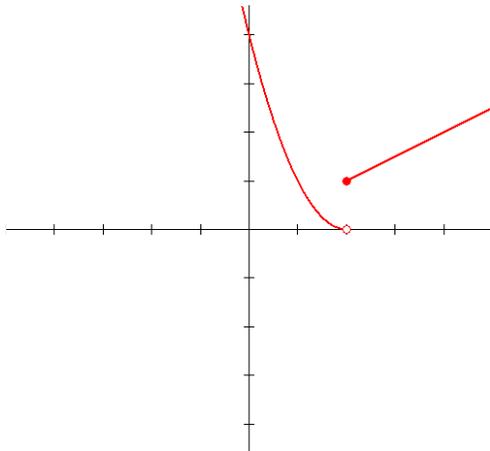


Math 1314 Course Objectives

Objective #	Covered in Lesson #	Objective and Examples	Covered by the End of Week #
1	1,2	<p>Find $\lim_{x \rightarrow a} f(x)$ or $\lim_{x \rightarrow \infty} f(x)$ from either the graph of f or given the function. Find one-sided limits from either the graph of the function or from a piecewise-defined function.</p> <p>Ex: Find $\lim_{x \rightarrow 3} \sqrt{x^2 - 3}$</p> <p>Ex: Find $\lim_{x \rightarrow 2} \left(\frac{x^2 - 4}{x^2 - 3x + 2} \right)$</p> <p>Ex: Find $\lim_{x \rightarrow 5} \left(\frac{4}{x - 5} \right)$</p> <p>Ex: Find $\lim_{x \rightarrow 0} f(x)$ if $f(x) = \begin{cases} x^2 + 1, & x > 0 \\ 1 - 4x^2, & x \leq 0 \end{cases}$</p> <p>Ex: Find $\lim_{x \rightarrow \infty} \left(\frac{x^2 - 4x + 2}{x^3 + 2x^2 + 5x} \right)$</p> <p>Ex: Find $\lim_{x \rightarrow \infty} \left(\frac{5x^2 + 3x - 1}{2x^2 + 7x - 4} \right)$</p> <p>Ex: Find $\lim_{x \rightarrow \infty} \left(\frac{3x^3 - 9x + 2}{5x^3 - 5x + 3} \right)$</p> <p>Ex: Use the graph to find $\lim_{x \rightarrow 2^+} f(x)$, $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2} f(x)$ (if it exists).</p> 	3

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2	3	<p>Use the limit definition of the derivative to find the derivative of a polynomial function.</p> <p>Ex: Suppose $f(x) = 3x^2 - 7x - 4$. Find $f(x+h)$. Find $f(x+h) - f(x)$. Form the difference quotient. Use the limit definition of the derivative to find the derivative.</p>	3
3	4,5,6,7	<p>Find the first and second derivatives of a function (including exponential functions and logarithmic functions) using basic rules, product rule, quotient rule and/or chain rule.</p> <p>Find the first and second derivatives of each:</p> <p>Ex: $f(x) = 3x^3 - 4x^2 + 7x - 9 + e^x + \ln x$</p> <p>Ex: $f(x) = x^2 e^x$</p> <p>Ex. $f(x) = 5^x$</p> <p>Ex: $f(x) = \frac{5x+2}{3x-7}$</p> <p>Ex: $f(x) = (3x^3 - 8)^5$</p> <p>Ex: $f(x) = e^{3x^2+4}$</p> <p>Ex: $f(x) = \ln(7x^2 + 3)$</p> <p>Ex: $f(x) = \ln \left[\frac{x(x+2)^2}{(x-4)^5} \right]$</p>	5
4	8	<p>Find an equation of a tangent line to a function at a given value of x.</p> <p>Ex: Write an equation of the tangent line to $f(x) = 3x^2 - 6x + 2$ when $x = 1$.</p> <p>Ex: Write an equation of the tangent line to $f(x) = e^{3x}$ at the point $(2, e^6)$.</p> <p>Ex: Write an equation of the tangent line to $f(x) = \ln(2x - 3)$ at the point $(2, f(2))$.</p>	6
5	8	<p>Solve word problems that involve finding a rate of change at a given point.</p> <p>Ex: The population of a country is given by the function $P(t) = \frac{-1}{3}t^3 + 64t + 5000$ where P is measured in thousands of people and t represents time in years with $t = 0$ representing population now. Find the rate of change of the population in 2 years and in 4 years. Find the population in 2 years and in 4 years.</p>	6
6	9	<p>Solve problems involving marginal functions.</p> <p>Ex: Suppose a company determines that the cost to produce x units of its product is</p>	7

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		<p>$C(x) = 100x + 200000$ dollars. The relationship between the unit price p and the quantity demanded x is $p = -0.02x + 400$. Find the profit function, the marginal profit, compute $C'(2000)$ and interpret your results.</p> <p>Ex: The cost to produce x units of a product is $C(x) = 100x + 200000$ dollars. Find the average cost function.</p>	
7	10, 11	<p>Find the x and y coordinates of the relative extrema of a function, using either the First Derivative Test (Lesson 10) or the Second Derivative Test (Lesson 11) to find the x coordinate.</p> <p>Ex: Find the x and y coordinates of the relative extrema of $f(x) = \frac{1}{3}x^3 - 4x^2 + 5$.</p> <p>Ex: Use the second derivative test to find the x coordinate of any relative extrema: $f(x) = x^2e^{2x}$</p>	7
8	10	<p>State intervals on which a function is increasing and intervals on which it is decreasing by analyzing the first derivative.</p> <p>Ex: Determine the intervals on which the function is increasing and the intervals on which the function is decreasing: $f(x) = \frac{1}{3}x^3 - 4x^2 + 5$</p>	7
9	11	<p>Find the x and y coordinates of any inflection points of a function.</p> <p>Ex: Find any inflection points: $f(x) = x^4 - 4x^3$</p>	8
10	11	<p>State intervals on which a function is concave upward and intervals on which it is concave downward by analyzing the second derivative.</p> <p>Ex: State intervals on which the function is concave upward and intervals on which the function is concave downward. $f(x) = x^4 - 4x^3$</p>	8
11	12	<p>Use factoring by grouping or the rational roots theorem to find rational zeros of a polynomial function of degree four or lower.</p> <p>Ex: Find any rational zeros or state that there are none: $f(x) = 2x^3 + x^2 - 2x - 1$</p> <p>Ex: Find any rational zeros or state that there are none: $f(x) = x^3 - 3x^2 - 4x + 12$</p>	8

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12	12	<p>Use the guide to curve sketching to sketch the graph of a polynomial or exponential function.</p> <p>Ex: Use the guide to curve sketching to sketch $f(x) = x^4 - 4x^3 + 8$.</p> <p>Ex: Use the guide to curve sketching to sketch $f(x) = xe^x$.</p>	9
13	13	<p>Find the absolute extrema of a function over a closed interval or over $(-\infty, \infty)$.</p> <p>Ex: Find the absolute extrema of $f(x) = 2x^3 - 4x^2 + 3$ on the interval $[-1, 1]$.</p> <p>Ex: Find the absolute minimum: $f(x) = x^4 - 4x^3$.</p>	9
14	14	<p>Solve word problems involving optimization.</p> <p>Ex: Suppose you wish to fence in a rectangular shaped field on your farm. You have 3000 m of fencing to use. What dimensions of the field will give a maximum area?</p> <p>Ex: An open top box is made by cutting equal squares from each corner of a piece of cardboard measuring 10 inches by 15 inches and then folding up the resulting flaps. What are the dimensions that yield the largest volume, and what is that volume?</p> <p>Ex: A farmer wants to fence in a rectangular shaped pasture on his land. One side of the pasture will be along a river and will not need to be fenced. He has 500 yards of fencing material to use. What is the maximum area he can fence in?</p> <p>Ex: Postal regulations require that the girth plus length of a package sent through the postal service can be no more than 108 inches. A parcel has a square base. What are the dimensions of the box with maximum volume that can be made under these conditions?</p>	10
15	15	<p>Solve word problems involving exponential functions.</p> <p>Ex: Population of a city in 2000 was 2.4 million people. Three years later, the population was 2.51 million people. Assuming population grows exponentially, write an equation expressing the population of the city in terms of time. Use the equation to approximate the population in 2010. What will be the rate of change of the population in 2010?</p>	10
16	16, 17	<p>Find the antiderivative of a function (including exponential functions and logarithmic functions) using basic rules or substitution.</p>	11

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		<p>Ex: Find the antiderivative: $\int (3x^2 - 8x + 4e^x) dx$</p> <p>Ex: Find the antiderivative: $\int \left(\frac{2x}{x^2 + 4} \right) dx$</p> <p>Ex: Find the antiderivative: $\int \left(\frac{5}{x^4} \right) dx$</p> <p>Ex: Find the antiderivative: $\int (e^{6x}) dx$</p>	
17	16	<p>Solve simple initial value problems.</p> <p>Ex: Solve the initial value problem:</p> $\left. \begin{array}{l} f'(x) = 4x + 7 \\ f(4) = -1 \end{array} \right\}$	11
18	18	<p>Use Riemann sums to approximate the area under a curve.</p> <p>Ex: Suppose $f(x) = 3x^2 + 4$. Use Riemann sums to approximate the area under the curve on the interval $[0, 4]$ using</p> <ol style="list-style-type: none"> 4 subintervals and right endpoints 2 subintervals and midpoints 8 subintervals and left endpoints 	12
19	19, 20	<p>Find a definite integral.</p> <p>Ex: Evaluate $\int_1^3 (x^2 - 6x + 3) dx$</p> <p>Ex: Evaluate $\int_0^4 (e^{3x}) dx$</p> <p>Ex: Evaluate $\int_1^2 x(x^2 + 4)^5 dx$</p> <p>Ex: Evaluate $\int_3^5 \left(\frac{3}{2x - 5} \right) dx$</p>	13
20	19, 20	<p>Use definite integrals to solve word problems.</p> <p>Ex: The management of a company has found that the daily marginal cost of producing x of items is given by $C'(x) = 0.000006x^2 - 0.006x + 4$. The fixed daily cost of producing the products is \$100. Find the total cost of producing the first 500 units.</p>	13
21	19, 20	<p>Find the average value of a function.</p> <p>Ex: Find the average value of $f(x) = 3x^2 - 4x + 1$ on the interval $[-2, 4]$.</p>	13
22	21	<p>Find the area between two curves over a stated interval.</p> <p>Ex: Find the area between $f(x) = x^2 + 4$ and $g(x) = 3 - x$ between $x = -1$ and $x = 4$.</p>	13
23	22	<p>Evaluate a function of several variables at (a, b).</p>	14

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		Ex: Suppose $f(x, y) = 3x^2y - 5xy^2 + 6xy + 9$. a. Find $f(0, -2)$. b. Find $f(3, -2)$.	
24	23	Find first and second order partial derivatives of functions of two variables. Find the first and second order partial derivatives of each: Ex: $f(x, y) = 3x^2y - 5xy^2 + 6xy + 9$ Ex: $f(x, y) = 3x^2 - 7xy + 6xy - 8y + 5$	14
25	24	Find relative extrema of functions of two variables. Ex: Find any relative extrema: $f(x, y) = 3x^2 - 4xy + 4y^2 - 4x + 8y + 4$	14