

Test #2 will be given on Wednesday, March 1. It will include material from Sections 2.5 – 2.9 and 3.1.

MAKEUP POLICY REMINDER:

If you know in advance that you have to miss a quiz or test, you can make arrangements with me to take the quiz or test **before** it is given in class. Otherwise, no makeup quizzes will be given. If you miss an hour test, it may be made up only if you

1. Contact me on or before the scheduled test date. My office telephone number is 301-279-5215. If I am not there, leave a message stating your telephone number clearly and telling me when I can reach you.
2. Can prove that you have a legitimate excuse.
3. Show me all homework on the relevant material.

If you do not meet these conditions, you will not be permitted to take a makeup test and the percentage equivalent of your final exam grade will be substituted for the grade of the missed test. No student will be permitted to take more than one makeup test.

To be prepared for this test, you should be able to

- Evaluate limits as $x \rightarrow a$, $x \rightarrow a^-$, $x \rightarrow a^+$, where a is a finite number. If a limit is undefined because the function is becoming infinite, you should be able to determine if the function is approaching ∞ or $-\infty$.
- Evaluate limits as $x \rightarrow \infty$ or $x \rightarrow -\infty$ numerically, graphically, and analytically.
- Determine the vertical and horizontal asymptotes of a function.
- **Use the definition of the derivative** at a point to find $f'(x)$ for a function. This involves knowing the definition *exactly*.
- Estimate the value of the derivative numerically and graphically.
- Interpret the derivative verbally.
- Understand the relationship between the behavior of a function and the behavior of its derivative; be able to sketch the graph of the derivative from the graph of the function.
- Understand the concept of a differentiable function and how a function can fail to be differentiable.
- Interpret the second derivative.
- Use the first and second derivatives to obtain information about the behavior of a function; sketch the graph of a function f from the graph of f' or from information about f , f' and f'' .
- Differentiate algebraic and exponential functions using differentiation rules from Section 3.1.
- Use derivatives to solve problems involving tangent lines and velocity.

Suggested Review Exercises from your textbook:

Chapter 2 Review (p. 175) Concept Check: 9 – 16 True-False: 9, 15, 16 Exercises: 1, 2, 6, 9, 12, 27, 29, 33, 35, 37, 39, 41, 43, 44a and b	Chapter 3 Review (p. 255) True-False: 1, 6, 12 Exercises: 3, 60, 63
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Additional Review Exercises

1. Let $f(x) = \frac{2x^2 + 5x - 3}{7(x^2 - x - 12)}$.

- (a) **Analytically** (without using your calculator) determine all vertical and horizontal asymptotes of $f(x)$.
- (b) **Analytically** (without using your calculator) determine $\lim_{x \rightarrow -3} f(x)$.
- (c) At what value(s) of x is $f(x)$ discontinuous?

Note: Your answers should be fractions or whole numbers, not decimals.

2. Use your calculator to determine a numerical estimate for $f'(3)$ if $f(x) = 2^x$. Your answer should be correct to at least three decimal places.
3. Let $h(t)$ be a person's height (in inches) as a function of his or her age (in years).
- (a) What are the units of $h'(t)$?
- (b) Write a sentence explaining the meaning of the statement $h'(13) = 2$.
- (c) Write a sentence explaining the meaning of the statement $h'(30) = 0$.
4. Find the derivative of each function.

(a) $f(x) = 5x^3 - 3x^2 + 7x - 12$	(b) $y = e^x + x^e + e^e$	(c) $g(x) = \frac{x^4}{4} - \frac{2x^3}{3} + \frac{x^2}{2} + \frac{x}{5}$
(d) $f(x) = \frac{4}{x^4} - \frac{3}{2x^3} + \frac{2}{x^2} + \frac{5}{x}$	(e) $y = x\sqrt{x} - 3\sqrt{x} + \sqrt[3]{x^2}$	(f) $f(x) = \frac{x^4 - 5x^2 - 3}{x^2}$

5. Write the equation of the tangent line to $y = 3e^x + 2x - 7$ when $x = 0$ on the curve.
6. For what value or values of x does the function $y = \frac{1}{3}x^3 + 2x^2 - 12x + 7$ have a horizontal tangent line?
7. Let $f(x) = \frac{1}{x}$
- (a) Write the equation of the tangent line to $f(x)$ when $x = 1/3$ on the curve. Check your results graphically by graphing the function and the tangent line.
- (b) For what value or values of x does the function $f(x) = \frac{1}{x}$ have a tangent line with slope of -4?