

Exam 2 Review Sheet

- I. Section R6, Laws of exponents.
- A. Properties of exponents, in particular the blue box on page xxxvii.
 - B. You may be asked to simplify an expression like (a) $\frac{x^5 - x^{-2}}{\sqrt{x}}$, or (b) $\sqrt{x}\left(x^5 + \frac{1}{x^2}\right)$ to eliminate the products and quotients, as you would have done solving a power rule problem, before you knew the quotient rule. Item (a) simplifies to $x^{9/2} - x^{-5/2}$, and item (b) simplifies to $x^{11/2} + x^{-3/2}$.
 - C. If you are asked to find a derivative of such an expression, you may use the product or quotient rule or you may simplify and then use the power rule, as you see fit.
- II. Section 2.2 Logarithmic functions.
- A. The parts of this section that you need to know are those covered in the WeBWork on logs, including finding the domains of functions with logs.
 - B. Examples that we did cover include Examples 1, 2, 4b, and 5. See also Section 2.2, Exercises 27-32.
- III. Section 4.1 Techniques for finding derivatives
- A. Know and be able to use the rules from this section. Make sure not to confuse the rules concerning constants.
 1. Constant Rule (the derivative of a constant function is 0).
 2. Constant times a function (the derivative of a constant times a function is the constant times the derivative of the function).
 - B. Remember that the derivative of a function at a point is the slope of the tangent line to the graph of the function at that point.
 1. Know how to find the equation of the tangent line to the graph of a function at a point. See Section 4.1 Exercises 31-34.
 2. Know how to find the values of x for which the tangent line is horizontal (i.e. has zero slope). See Section 4.1 Exercises 36-39.
 - C. Remember that the derivative is the rate of change of the function with respect to the variable.
- IV. Section 4.2 Derivatives of products and quotients. Know and be able to use the product and quotient rules.
- V. Section 4.3 The chain rule. Know and be able to use the chain rule.
- A. We did problems in which certain values of f and f' were given, but the formula for f was not given (for example, you might have been given that $f(3)=5$ and $f'(3)=7$, and been asked for the derivative of $[f(x)]^2$ at $x=3$ (the answer is 70)). In addition to the Chain Rule itself, there are formulas that might elucidate these problems.
 1. Generalized Power Rule, page 227.
 2. Derivative of $a^{g(x)}$ and $e^{g(x)}$, page 235.
- VI. Section 4.4 Derivatives of exponential functions. Know and be able to use the formulas for the derivative of e^x and a^x .
- VII. Section 4.5 Derivatives of logarithmic functions. Know and be able to use the formulas for the derivative of $\log_a(x)$ and $\ln(x)$.

About the exam:

1. You will be asked to calculate derivatives of functions using the rules introduced in Sections 4.1-4.5. Be sure to double check your work for type-os.
2. You will be asked a word problem in which the derivative of a model is involved. Be careful to use the right units on your answers.
3. You will be asked questions about the tangent line to the graph of a given function.
4. You will be asked about properties of logs and exponential functions.
5. You may be asked a problem like those described in (VA) above.