

MATH 1A – REVIEW FOR MIDTERM #2

KEZIAH COOK

1. THINGS TO MEMORIZE

1.1. General Differentiation Rules.

- Derivative of a constant multiple of a function
- Derivative of the sum of 2 functions
- Product Rule
- Quotient Rule
- Chain Rule
- Power Rule

1.2. Derivatives of Elementary Functions.

- $\ln x$
- e^x
- $\log_a x$
- a^x
- Trig functions ($\sin x$, $\cos x$, $\tan x$, $\sec x$, $\csc x$, $\cot x$)

2. THINGS TO UNDERSTAND

- How to combine the differentiation rules with the derivatives of elementary functions to differentiate anything!
- The physical interpretation of $\frac{dy}{dx}$ in terms of physics (velocity, acceleration, density); chemistry (rate of reaction); biology (growth rates); and economics (marginal cost/profit).
- Implicit Differentiation: How to find $\frac{dy}{dx}$ when an equation is not solved for y . (i.e Find $\frac{dy}{dx}$ when $y^2 + 2xy + x^2 = 3x + \sin x$)
- Logarithmic Differentiation: Simplify equations by taking the natural log of both sides before finding the derivative via implicit differentiation.
- Linear Approximations and finding tangent lines
- Relating rates of change of 2 or more physical quantities
- Finding local and absolute minimum and maximum values of a function
- Testing Critical points using the 1st and 2nd derivative tests

- Finding intervals on which a function is increasing or decreasing, concave up or concave down; finding inflection points
- Recognizing indeterminate forms of limits and evaluating limits using L'Hospital's Rule or by taking the log of the limit.
- General technique for solving optimization problems
- Newton's method for finding zeros of a function

3. HINTS AND TIPS

3.1. Before the Exam.

- Practice makes perfect! Work through as many practice problems as you can. The old exams posted on the web are a good source, as are the end of chapter reviews in the book.
- Work on understanding how to solve various types of problems, rather than just memorizing a series of steps – this will make it easier to solve unfamiliar types of problems which use the techniques we've learned.
- Email me if you are really stuck on a practice problem– I might be able to help.

3.2. During the Exam.

- Work smarter, not harder! When there are multiple ways to approach a problem, try to use the one that is quickest. For example, it's often easier to use logarithmic differentiation to find the derivative of a quotient rather than the quotient rule.
- Think about what the problem is asking. Many calculus problems have physical interpretations. This means you can often catch calculation errors using common sense (i.e. lengths and volumes shouldn't be negative, what goes up must come down, etc.)
- Try to leave a couple of minutes to check your work at the end of the exam.

Good Luck!!!

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