

Review for Exam 2

MATH 130: Calculus I

IMPORTANT: We will be taking our second exam on Thursday, March 21st in lab. I will provide you with a non-graphing calculator; you may **not** use your own. Remember that there will be randomized seating at the exam. Wait until the names have been laid out before taking a seat in Gulick 2000.

Below are listed some of the types of problems that may appear on the exam. After many of them are suggested practice problems from the review sections of Chapter 2 (pages 128-130) and Chapter 3 (pages 236-240). Remember that you can always try problems I did not assign from the sections as well.

Know How to...

- (1) evaluate limits at infinity especially of functions with roots (2: 34, 37, 56).
- (2) find horizontal asymptotes of a function (2: 56, 59, 60, 67).
- (3) find points of discontinuity using graphs of functions (2: 5).
- (4) determine the continuity of functions and classify discontinuities using equations of functions (2: 72, 73, 75, 77, 79, 81).
- (5) evaluate left and right continuity of a function (2: 80).
- (6) use the Intermediate Value Theorem to solve a problem (2: 82a).
- (7) find the derivative using the limit definition (3: 3).
- (8) sketch a graph of $f'(x)$ given a graph of $f(x)$ (3: 82, 83).
- (9) given a graph of a function, state, with reasons, where the function is not differentiable (3: 81).
- (10) given an equation of a function, state, with reasons, where the function is not differentiable.
- (11) find derivatives using rules (power, product, quotient, chain, etc.) (3: 9-19 odd, 25, 31, 39).
- (12) find the equation of a tangent line to $f(x)$ at a point (3: 5, 41, 43).
- (13) find the points where the tangent line is horizontal or has another specified slope.
- (14) find velocity and acceleration functions given a position function and use them.
- (15) find higher derivatives of functions (3: 66, 68).
- (16) find the first and second derivative using implicit differentiation (3: 57, 59, 71).

Remember...

- (1) **to distinguish between your function and your derivative.**
- (2) to review your definitions and theorems.
- (3) to practice problems **without** your book or notes.
- (4) to bring a pencil with a good eraser.
- (5) to ask me questions if you are stuck or need clarification.
- (6) to breathe!

NOTE: There may be true/false and short answer questions in addition to problems. See Chapter 3 Review number 1!

NOTE: When simplifying, make sure you have gathered all like terms, eliminated negative exponents and fractions within fractions, as well as cancelled where possible. The trig identities you should know are: $\tan x = \frac{\sin x}{\cos x}$, etc., $\sin^2 x + \cos^2 x = 1$, etc., $\sin(2x) = 2 \sin x \cos x$ and $\cos 2x = \cos^2 x - \sin^2 x$.

NOTE: This is a **rough** outline. The exam will be over Sections 2.5-2.6, and 3.1-3.8. You should be sure to review all of your group work, labs, WeBWorK, practice problems and **notes** from these sections.

Practice Problems from the last few sections...

1. Evaluate the following:

(a) $\lim_{\theta \rightarrow 0} \frac{\sin^2(4\theta)}{\theta^2}$

(b) $\lim_{\theta \rightarrow 0} \frac{\cos \theta - 1}{\sin \theta}$

2. Differentiate the following:

(a) $f(x) = \sec^2(13x^2) - \frac{8}{\sqrt[5]{x}}$

(b) $g(x) = e^{\cos x} \tan(6x^3)$

(c) $h(x) = \frac{xe^x}{\sin x}$

3. Find the equations of the tangent lines to $f(x) = x\sqrt{5-x^2}$ at $x = 1$ and $x = -2$.

4. If $y = x^2 \sin y$, find $\frac{dy}{dx}$.

5. Find $\frac{dy}{dx}$ if $3(x^2 + y^2)^2 = 100xy$.