Review for Exam 3

MATH 130: Calculus I

IMPORTANT: We will be taking our third exam on Thursday, April 20th in lab. I will provide you with a non-graphing calculator; you may **not** use your own.

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 3 (pages 232-235) and Chapter 4 (pages 330-332). Remember that I have suggested many option problems and you can always try problems I did not assign from the sections as well – those may be even better than the ones from the review sections below.

Know How to...

(1) find derivatives of logarithmic and exponential functions of different bases (3: 27-35 odd).

(2) and when to use logarithmic differentiation (3: 32, 33).

(3) find the derivative of an inverse function without finding the inverse (3: 57, 61).

(4) find derivatives of inverse trigonometric functions (3: 31, 34, 35).

(5) solve related rates problems (3: 69, 71).

(6) find absolute maximum and minimum values of a function on a closed interval (4: 7, 9).

(7) use the Single Extremum Theorem to find absolute maximum and minimum values of a function.

(8) show that a function has exactly one real root (use your notes!).

(9) apply Rolle's Theorem to a function on a given interval (remember to check the hypotheses).

(10) apply the Mean Value Theorem to a function on a given interval (remember to check the hypotheses) (4: 33).

(11) find the critical numbers of a function (remember to check the domain) (4: 7, 9).

(12) find the intervals of increase and decrease (4: 15, 17).

(13) find local extrema using either the first or second derivative test (4: 15, 17).

(14) find intervals of concavity and points of inflection (4: 15, 17).

(15) evaluate limits of indeterminate forms of type $\dfrac{0}{0}$ and $\dfrac{\infty}{\infty}$ (4: 39, 41).

(16) graph functions and label all important points and asymptotes (4: 3, 17).

Remember to...

(1) include theorem names in your solutions where appropriate.

(2) include the limit sign and equals sign where appropriate!

(3) distinguish between your function and your derivative.

(4) explicitly state your asymptotes with line equations (for example, $x = 4$ or $y = -1$).

(5) review your definitions and theorems.

(6) practice problems with**out** your book or notes or friends.

(7) explain how to do problems to your friends.

(8) bring a pencil with a good eraser.

(9) ask me questions if you are stuck or need clarification.

(10) breathe!

NOTE: There may be true/false and short answer questions in addition to problems. There are examples of these in every section under the "Explain why or why not" problems. Many of these we have discussed.

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: $\tan x = \dfrac{\sin x}{\cos x}$, etc., $\sin^2 x + \cos^2 x = 1$ and $\cos 2x = \cos^2 x - \sin^2 x$.

NOTE: You should know all formulas that have been used in related rate problems for homework, class or lab. However, if you forget them during the exam you can ask me for one in exchange for points.

NOTE: This is a **rough** outline. The exam will be over Sections 3.9-4.3, 4.6 and 4.7. You should be sure to review all of your WeBWorK, homeworks, labs, extra fun and **notes** from these sections.

NOTE: I will not ask you to remember the proof of the Mean Value Theorem as one of the regular problems, but I may ask you to explain all or part of it as part of a bonus problem.