Preparing for Exam 3

1. **The ideas are the most important thing!** And what are those ideas? A partial list is:

- *Implicit Differentiation* Besides taking the derivative $\frac{dy}{dx}$ of a function $y = f(x)$ explicitly you should be able to differentiate functions which can NOT be written as explicit functions of x, but have the form $f(x,y) = c$ instead.

- *Related Rates* You should be able to apply The Chain Rule to compute how a function of multiple variables has derivatives related to each other. In other words, you have a function $F(x,y)$ and you have $x(t)$ and $y(t)$ then
$$\frac{dF}{dt} = \frac{dF}{dx}\frac{dx}{dt} + \frac{dF}{dy}\frac{dy}{dt}$$

- *Newton's Method* A useful iterative technique for solving equations of the form $f(x) = 0$. You should know the iterative step $x_{n+1} = x_n - f(x_n)/f'(x_n)$ and how to use it to find a sequence of approximations which produce a solution to the equation.

- *Limits* You should understand what the possible values of a limit can be (a number, $+\infty$, $-\infty$ or DNE). You should also understand limits from the left and limits from the right. You shold understand that a limit is a link between two *processes* or *trends*. It says that as one sequence of numbers gets closer and closer to a particular value, this other related sequence of numbers also hopefully gets closer and closer to some other number, which we call the limit.

- *L'Hôpital's Rule* For indeterminate limits of the form $\frac{\infty}{\infty}$, $\frac{0}{0}$ and $0 \cdot \infty$ you should know how to apply L'Hôpital's rule.

- *Continuity and Differentiability* You should know when the rules are that you can evaluate a limit $\lim_{x \to c} f(x)$ by just using direct substitution, i.e. $f(c)$. A function is said to be continuous if you can evaluate a limit in such a manner. A function is not differentiable at a point if the derivative does not exist at that point, which would mean that the limit of difference quotients does not exist at that point.

- *Horizontal and Vertical Asymptotes* You should know what limits you need to take in order to determine whether a function $f(x)$ has horizontal asymptotes. Also, you should know how you find vertical asymptotes.

- *Curve Sketching* You should be able to apply your knowledge of derivatives to find intervals on which the function is positive/negative, increasing/decreasing, concave up/concave down, as well as determining where the asymptotes are.

2. **Problems will closely resemble the practice exam questions.** But they will not be identical to these. An excellent way to study is to make up a mock exam. Make a list of the major themes and skills and write problems of three sorts: those which test one (or maybe two) basic skills, those which test for understanding of major themes and those which combine the two. Then give your mock exams to each other.

3. **Don't forget about labs.** The story being told in lab closely parallels the story being told in class.

Rules for the Exam

1. **Blue Notes:** You are allowed the attached sheet of paper for written notes. Only the use of notes on **one side** of this sheet of paper are permitted during the exam. You may not use the program function of your calculator to store additional notes. There will be fewer problems involving simple calculations and more involving interpretations of the main ideas, i.e. short answer questions.

2. You must take the exam during your regularly scheduled lecture unless you have made prior arrangements with us. Anyone "oversleeping" will not be allowed to take the exam at all, ever. No athletic excuses will be accepted without a written note from the head coach prior to the exam.

3. There will be a pledge on the exam. By signing the pledge, you indicate that you followed all the rules of this exam. Furthermore you promise not to discuss the exam with anyone (even people who have already finished the exam) until after **10:30 am on Monday November 23rd**. It is our collective responsibility to keep the exam as fair as possible.

4. No answer will be given credit without accompanying work. **No exceptions.** Unless otherwise indicated, answers should be left in exact form, i.e. no decimal approximations.

5. This list of rules is not necessarily exhaustive. If you have any questions about what is allowed and what is not, you are responsible for asking me. Ignorance is not an excuse.

BLUE NOTES

Name: _____