

**Topics for Exam 3**  
**Math 30, Fall 2004**

**General information.** Exam 1 will be a timed test of 50 minutes, covering 3.6–3.11, 4.1, 4.3, and 4.5 of the text. Most of the exam will be based on the homework assigned for those sections. If you can do all of that homework, and you know and understand all of the ideas behind it, you should be in good shape. As before, you are allowed to use a calculator and notes on **ONE**  $3 \times 5$  note card (both sides).

As mentioned above, your first priority should be to understand the homework and quizzes and the ideas behind them. Besides the list of things you should know, below, you should also be familiar with everything specially emphasized in the text. If time permits, try to do some of the problems that have answers in the back of the book.

Note that while this exam will **not** be comprehensive, some of the basic material from Exam 2 may be relevant, like calculating the tangent line to a curve, the idea of a derivative as a rate of change, and so on. Again, your homework is the best guide.

**Section 3.6.** Basic idea of implicit differentiation. When an implicit derivative exists. Tangent lines, etc. Derivatives of inverse trig functions.

**Section 3.7.** Higher derivatives: definition, interpretation. Velocity and acceleration.

**Section 3.8.** Derivative of  $\ln x$ . Logarithmic differentiation.

**Section 3.9.** Definition of hyperbolic functions. Derivatives of hyperbolic functions.

**Section 3.10.** Basic idea of related rates. Setting up related rates problems. Particular examples.

**Section 3.11.** Basic idea of the tangent line approximation. Calculating the TL approximation. When is the TL approximation too high/too low?

**Section 4.1.** Definitions: Absolute/global min/max; min/max value; extreme values; local/relative min/max; critical number. Extreme value theorem, Fermat's Theorem. The Closed Interval Method.

**Section 4.3.** Definition: Concave up/down. **THE BOX:** Sign of  $f'$ ,  $f$  increasing/decreasing; sign of  $f''$ ,  $f'$  increasing/decreasing,  $f$  concave up/down. Testing critical numbers for local min/max: First Derivative Test, Second Derivative Test.

**Section 4.5.** Guidelines for Sketching a Curve (omit D. Asymptotes). Examples.

**Not on exam.** (3.6) Orthogonal trajectories. (3.8) Derivatives of un-natural logs; the number  $e$  as a limit. (3.9) Hyperbolic trig identities; inverse hyperbolic functions and their derivatives. (3.11) Differentials. (4.5) Slant asymptotes.