Engineering and Science Mathematics 1A

Review for Midterm I

Exam date: October 5, 2010

1. Limits, one-sided limits. Typical questions include p. 97 no. 30, 35, or the computation of the limit
$$\lim_{x\to\infty} e^{-x} \ln x\,.$$
Be familiar with the "squeeze law" and its application.

2. Continuity: When is a function continuous, can a discontinuous function be extended to be continuous? Can you show that differentiability implies continuity?

   Practice question: How can you define $f(0)$ of the function
$$f(x) = x^2 \sin\frac{1}{x}$$
   so that f is a continuous function? Is the resulting function differentiable at $x = 0$? If so, what is its derivative? Is the derivative continuous?

3. Derivative: Definition, compute the derivative in simple cases as the limit of a difference quotient; differentiation rules; derivatives of trigonometric functions, log, exp.

4. Applied minimax problems (lots of practice examples on pages 158 and 159 on the Homework 4 handout).

5. Curve sketching: Finding critical points; when does a critical point correspond to a minimum, when to a maximum? Concavity, Points of inflection. See Homework 4 problems.

Exam rules:

- No notes and calculators.
- Paper will be supplied.
- Respect the Code of Academic Integrity. It will be enforced.