Mathematics 134 – Intensive Calculus for Science 2
Exam 1 – Things To Know
February 8, 2002

General Information

As announced in the course syllabus, the first full-period midterm exam of the semester will be given in class on Friday, February 15. The format will be similar to that of the midterm exams last semester. The exam will cover the material since the start of the semester (Quizzes 1,2,3), including the following material from Chapters 5, 6, and section 1 of Chapter 7.

1) Riemann sums and the definite integral
2) Applications to computing areas, average values, total change of a function
3) The Fundamental Theorem of Calculus: If $F(x)$ is an antiderivative of a continuous function $f(x)$ on $[a, b]$, then

$$\int_a^b f(x)\ dx = F(b) - F(a)$$

4) Antiderivatives graphically and numerically
5) The power, sum, and constant multiple rules for antiderivatives
6) Differential equations $\frac{dy}{dx} = f(x)$
7) Integrals by substitution

There will be a review for the exam in class on Thursday, February 14. I can also try to set up an evening session with Kathryn Blaisdell on Thursday for other questions.

Sample Exam

I. The following graph shows $y = f(x) = \begin{cases} 1 & \text{if } -2 \le x \le 0 \\ \sqrt{1 - x^2} & \text{if } 0 \le x \le 1 \\ 0 & \text{if } 1 \le x \le 2 \end{cases}$

A) Use the information from the graph to compute the left- and right-hand sums for $f(x)$ on $[-2, 2]$ with $\Delta x = 1/2$.

B) Should the value of your *left-hand sum* be smaller than or larger than the actual value of the integral of this function? Explain how you can tell.
C) The part of the graph from $x = 0$ to $x = 1$ is part of a circle. Use this to determine the exact average value of $f(x)$ on $[-2, 2]$.

II. The following graph shows $y = F'(x)$, the *derivative* of F. Sketch the graphs $y = F(x)$ in the cases $F(0) = 0$ and $F(0) = 1$.

III. A child throws a baseball vertically upward with velocity 12 ft/sec from an initial height of 4 feet. The acceleration of the baseball due to gravity is -32 ft/sec^2, so the velocity function v satisfies the differential equation

$$\frac{dv}{dt} = -32$$

A) Find formula for the velocity as a function of time.
B) When does the baseball reach its highest point? When does it hit the ground?
C) Find the greatest height the ball reaches.

IV. Compute the following integrals.

A) $\int 5x^4 - 3\sqrt{x} + e^x + \frac{2}{x}\ dx$

B) $\int x(4x^2 - 3)^{3/5}\ dx$

C) $\int_1^2 e^{\sin(\pi x)} \cos(\pi x)\ dx$

D)

$$\int \frac{t^2 + 1}{t^3 + 3t + 3}\ dt$$

Also see Problem Sets 1,2,3, the last three quizzes, and the Review Problems from the ends of Chapters 5,6,7 in the text for other practice problems.