Math. 270-05
Fall, 2005
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Second Examination

Monday, September 26, 2005

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. Each entire problem is worth 25 points. You may keep this exam sheet.

1. Sketch a graph of the derivative of the function in Figure 1.

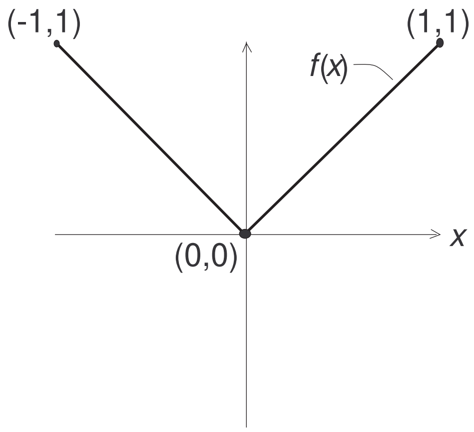

Figure 1: The function f for problem 1

2. Use the definition of limit and algebraic manipulations to evaluate the following limits.

$$\text{(a)}\quad \lim_{h\to 0}\frac{\frac{1}{x+h}-\frac{1}{x}}{h} \qquad \text{(b)}\quad \lim_{h\to 0}\frac{(x+h)^3-x^3}{h}$$

3. Draw the graph of a function $f(x)$ such that $f(0) = 1$, $f'(0) = 1$, $f''(x) < 0$ for $x > 0$, $f'(1) = 0$, and $f(2) = 0$.

4. Compute df/dt algebraically, for the following functions f. (Assume that all letters occurring except for f and t represent constant numbers.)

$$\text{(a)}\quad f(t) = -\frac{1}{2}gt^2 + v_0t + s_0 \qquad \text{(b)}\quad f(t) = t^3 + 3t^2 + 3t + 1$$