Math 323 — **Quiz 2** — May 11, 2005

Please PRINT your name and ID# below. Write clearly and cross-out work not to be graded. The questions are to be answered directly on this paper as indicated.

Name:_____ ID:_____

1. **Define**: (where appropriate, you may use sequences or ϵ/δ-types) (25 pts.)

   (a) $\lim_{x\to a^-} f(x) = L$, where $a, L \in R$:

   (b) $\lim_{x\to a} f(x) = -\infty$, where $a \in R$:

   (c) The function $f(x)$ defined on an open interval containing the point $a \in R$ is **differentiable at** a.

   (d) The sequence of functions $f_n(x)$ **converges uniformly** to $f(x)$ on the set $S \subseteq R$:

   (e) The sequence of functions $f_n(x)$ **converges pointwise** to $f(x)$ on the set $S \subseteq R$:

Quiz continues on reverse. Please TURN OVER.

2. Let f be defined on R and suppose that $|f(x) - f(y)| \leq (x - y)^2$ for all $x, y \in R$. (15 pts.)
Prove that f is a constant function:

3. Let $f_n(x) = (1 - \frac{1}{n})x$ for $x \geq 0$ and $f_n(x) = -1$ for $x < 0$.

(a) Find the limit function $f(x)$ such that $f_n(x) \to f(x)$ on R: (10 pts.)

(b) **Extra credit:** Does f_n converge to f uniformly? Why or why not? (+5 pts.)