Math 1A Calculus Fall, 2004
Prof. Haiman

First Midterm Exam

Name _____ Student ID Number _____

Section _____

You may use one sheet of notes. No other notes, books or calculators.

There are 9 questions, on front and back. Each question is worth 11 points. You get 1 point for free. Write answers on the exam and turn in only this paper. Show work or briefly indicate a reason for your answers.

1. Find the domain of the function $f(x) = \sqrt{x} - \sqrt{3-x}$.

2. Find a formula for the inverse function $g(x)$ of the function

$$f(x) = e^{x^2+1}.$$

3. Evaluate the limit, if it exists (possibly as an infinite limit).

$$\lim_{x \to 3^-} \frac{x-5}{x-3}.$$

4. Evaluate the limit, if it exists (possibly as an infinite limit).

$$\lim_{x \to 1} \frac{x^3-1}{x^2-1}.$$

5. Let $f(x) = 3 + 1/x$. In the definition of the limit $\lim_{x\to\infty} f(x) = 3$, if $\varepsilon = 1/5$, how large must N be to guarantee that $|f(x) - 3| < \varepsilon$ for all $x > N$?

6. Show that the equation $x^4 - x - 1 = 0$ has at least one real solution in the interval $(1, 2)$.

7. Differentiate the function

$$f(x) = \frac{2x + 1}{x + 3}.$$

8. Differentiate the function

$$f(x) = \sqrt{x}\, e^x.$$

9. Find the values of x where the graph of $y = x^3 - 6x^2$ has a horizontal tangent line.