

Calculus I
Professor Glass
Midterm #1
September 28, 2005

Name:

Section (Circle One): 111C (10am) 111E (1pm)

Favorite CD:

Take a deep breath. Be sure to show all work, and any thoughts you have on the problems so that I can give you as much partial credit as possible. Feel free to use the backs of the paper. If you need to use additional paper please hand it in as well. If you have any questions, come find me in my office. The exam is out of 65 points. Good luck. Relax.

On this exam, you are allowed to use your calculator, your brain and a writing implement of your choice. Nothing else.

HONOR CODE PLEDGE:

1. Find the domain, range, and inverse of the following function (10 points)

$$f(x) = 10 - \frac{1}{x^2}$$

2. Find the inverse of the following function (7 points)

$$f(x) = \begin{cases} x + 2, & x < 0 \\ 5x + 2, & x \geq 0 \end{cases}$$

3. Calculate three of the following four limits or show that they do not exist. You must justify your answer algebraically to get full credit. If you do all four problems, please indicate clearly which ones you want me to grade or I will just grade the first three. (5 points each)

a) $\lim_{x \rightarrow 9} \frac{x^2 - 81}{\sqrt{x} - 3}$

b) $\lim_{x \rightarrow 0} x^2 \sin(1/x)$

c) $\lim_{x \rightarrow \infty} \frac{x + 5}{\sqrt{x^2 - 9}}$

d) $\lim_{x \rightarrow 1} \frac{e^x}{x^2 - 1}$

4. Sketch the graph of the equation $y = 2 + \frac{1}{x-1}$, labeling *at least* two points and explaining how you obtained this graph from the graph of $y = \frac{1}{x}$. You may **NOT** use your calculator on this problem. (8 points)

5. Without using a calculator, find a decimal approximation within .5 of the value of $\sqrt{5}$ using the Intermediate Value Theorem. (8 points)

6. In the space below, sketch the graph of a single function $f(x)$ which has the following properties (7 points)

- $\lim_{x \rightarrow 1^+} = 5$
- $\lim_{x \rightarrow 1^-} = -5$
- $f(x)$ has a vertical asymptote at $x = 5$
- $f(x)$ is not continuous at $x = 0$
- $\lim_{x \rightarrow 0} f(x) = 0$
- $f(x)$ has two different horizontal asymptotes.

7. For what values of x is the following function continuous? For what values is it discontinuous? As always, you should justify your answers as much as possible. (10 points)

$$f(x) = \begin{cases} x^2 + 2, & \text{if } x < -1 \\ \frac{1}{x} + 4, & \text{if } -1 \leq x \leq 1 \\ x + 5, & \text{if } x > 1 \end{cases}$$