MATH 151 - SPRING 2004
Midterm I

NAME:.....

This Exam contains 4 problems in 4 pages and a cover sheet.

You can use any calculator without a QWERTY keypad or symbolic manipulation capability. You are allowed to use a formula sheet. You can use NO other material. Use of such material may be regarded as a case of Academic Misconduct.

Please, show all your work. Incorrect answers with work may receive partial credit but unsubstantiated answers will get NO credit.

GOOD LUCK!

Prob1).....

Prob2).....

Prob3).....

Prob4).....

Total).....

Name:.....

1. (20 pts) Consider the function

$$f(x) = \begin{cases} \frac{1}{x-2} & \text{if } x > 3 \\ \cos x & \text{if } 0 \leq x \leq 3 \\ \frac{2}{x+2} & \text{if } x < 0 \end{cases}$$

Find each of the following (if they exist).

(a) $\lim_{x \to 0^-} f(x)$

(b) $\lim_{x \to 0^+} f(x)$

(c) $f(0)$

(d) $\lim_{x \to 3} f(x)$

(e) Find $\lim_{x \to 2} f(x)$

(f) List the discontinuities of $f(x)$

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2. (50 pts) Evaluate the following limits:

(a) $\lim_{x\to 0} \dfrac{\tan 2x}{x(x-3)}$

(b) $\lim_{x\to -\infty} \dfrac{3x^3 - 10x + 8}{\sqrt{4x^6 - 9x + 4}}$

(c) $\lim_{x\to 1} \sin\left(\dfrac{\pi(x^2-1)}{4x-4}\right)$

(d) $\lim_{x\to 1} \dfrac{9x^2 - 18x + 8}{x^2 - 3x + 2}$

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(e) $\lim_{x\to\infty}\left(\sqrt{4x^2+16x-1}-2x\right)$

(f) $\lim_{x\to 3}\dfrac{x-9}{\sqrt{x}-3}$

3. (10 pts) Show that the equation $x^2-\frac{1+x}{x^2}=0$ has at least one solution.

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4. (20)Describe the sets on which the following functions are continuous?[Please, show your work]
   [**Hint:** Note that each of the problem is useful for the next ones.]

   (a) $f(x) = 1 - x^2$

   (b) $\sqrt{1-x^2}$

   (c) $\tan\left(\frac{\pi}{2}\sqrt{1-x^2}\right)$
   [**Hint:** Don't let $\tan(\heartsuit)$ =DNE. This happens when $\heartsuit = ..., -\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}, ..]$