Midterm 1 — Version 1

MAT 125

October 9, 2002 8:30-10:00 PM

Name:	**ID #:**	**Section:**

(Section number is your **recitation** number, e.g. 01, 02, etc. Evening lecture 3 (MW 7-8:20) should use number 13; evening lecture 4 (Tu Th 5:30-6:50) should use number 14)

DO NOT OPEN THIS EXAM UNTIL INSTRUCTED

Please answer each question in the space provided. Please write full **solutions**, not just answers. Unless otherwise marked, **answers without justification will get little or no partial credit**. Cross out anything the grader should ignore and circle or box the final answer. Graphing calculators are allowed but not required; graph plotted by your graphing calculator can not be considered as a justification of your solution.

When calculating limits, please distinguish between the cases $\lim f(x) = \infty$, $\lim f(x) = -\infty$ and "$\lim f(x)$ does not exist even allowing for infinite values".

Problem	1	2	3	4	5	6	7	**Total:**
Max	20	10	10	15	15	15	15	100
Scores								

(1) (*20 points*) Calculate the following limits

(a) $\lim_{x\to 2} \dfrac{x^2-3x+2}{x^2-4}$

(b) $\lim_{x\to -2_+} \dfrac{x^2-3x+2}{x^2-4}$

(c) $\lim_{t\to 1} \dfrac{t^2+1}{t+1}$

(d) $\lim_{t\to 2} \dfrac{\sqrt{t}-\sqrt{2}}{t-2}$

(2) (*10 points*) Calculate

$$\lim_{x\to \pi} \ln(\cos 2x)$$

(3) (*10 points*) Explain why the equation

$$e^x = 2 - x$$

has a solution on the interval $0 \leq x \leq 1$. Explanation "it is clear from the graph" is not sufficient.

(4) (*15 points*) Calculate

$$\lim_{x \to 1_-} e^{\frac{1}{x-1}}$$

(5) (*15 points*) For the function

$$f(x) = \frac{2x^2 + 4x + 2}{x(x-2)}$$

find the horizontal and vertical asymptotes and write their equations.

(6) (*15 points*) Find the equation of the tangent line to the graph of $f(x) = \frac{2}{x}$ at the point $P = (2, 1)$.

(7) (*15 points*) Let $f(x)$ be given by the formula

$$f(x) = \begin{cases} 1/x, & \text{for } x < 1 \\ x + 1, & \text{for } x \geq 1 \end{cases}$$

Find all points where $f(x)$ is not continuous; for each such point a, find $\lim_{x \to a_+} f(x), \lim_{x \to a_-} f(x)$ and $\lim_{x \to a} f(x)$.