MATH 141

MIDTERM EXAM I

October 5, 2000

NAME (please print legibly): _____

Your Soc.Sec.Number: _____

E-mail address: _____

Circle your Instructor's Name along with the Lecture Time:

Ravenel(2 o'clock) Kojcinovic(9 o'clock) Kojcinovic(10 o'clock)

- **No calculators are allowed on this exam.**
- **Please show all your work. You may not receive full credit for a correct answer if there is no work shown.**
- **Please put your final answer in the space provided.**

QUESTION	VALUE	SCORE
1	10	
2	20	
3	30	
4	40	
5	50	
6	60	
7	70	
8	80	
TOTAL	550	

1. **(10pts)**

(a) Find the slope of the line through the points $(-1, 0)$ and $(5, 6)$.

ANSWER: _____

(b) Write the equation of this line.

ANSWER: _____

(c) Find the equation of the line parallel to the above line passing through the point $(-2, 0)$

ANSWER: _____

(d) Find the equation of the line perpendicular to the above line passing through the point $(1, 0)$.

ANSWER: _____

2. **(20pts)**

(a) Suppose you know that $tan(\theta) = 5$. What is $ctan(\theta)$?

ANSWER: _____

(b) What is $sec(\theta)$ knowing that $0 < \theta < \frac{\pi}{2}$?

ANSWER: _____

(c) What is $cos(\theta)$ with θ as above?

ANSWER: _____

(d) What is $sin(\theta)$?

ANSWER: _____

3. **(30pts)** State the domain of the following functions:

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

ANSWER: _____

(b) $arctan(\frac{1}{x})$

ANSWER: _____

4. **(40)** Solve for x in each of the following:

   (a) $ln(x) + ln(x^3) - ln(2x) = 3$

   ANSWER: _____

   (b) $e^{2x} - 2e^x + 1 = 0$

   ANSWER: _____

   (c) $ln(2^x) = ln(5)$

   ANSWER: _____

5. **(50pts)** Evaluate the following limits (note: some of them may be $+\infty$, $-\infty$, or may not even exist):

   (a) $\lim_{x \to 4}(x-3)^{10}$

   ANSWER: _____

   (b) $\lim_{x \to 1} \dfrac{1-2x^2}{x^2+x-2}$

   ANSWER: _____

   (c) $\lim_{x \to -1} \dfrac{x^2-2x-3}{x^2-x-2}$

   ANSWER: _____

   (d) $\lim_{x \to 1} \sqrt{\dfrac{x-2}{x-5}}$

   ANSWER: _____

6. **(60pts)** Let f be a function defined as follows:

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

(a) Evaluate the limit $\lim_{x \to 0^+} f(x)$.

ANSWER: _____

(b) Evaluate the limit $\lim_{x \to 0^-} f(x)$

ANSWER: _____

(c) State if the limit $\lim_{x \to 0} f(x)$ exists. If it does exist, evaluate it.

ANSWER: _____

7. **(70pts)** Evaluate the following limits at ∞:

(a) $\lim_{x \to \infty} \dfrac{4x+1}{8x - sin(x)}$

ANSWER: _____

(b) $\lim_{x \to \infty} \sqrt{\dfrac{4x+2}{8x-4}}$

ANSWER: _____

8. **(80)** Let $f(x) = \frac{1}{x}$. Find the tangent line to the graph of f at the point $(1, 1)$.

ANSWER: _____