King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Semester (011)
MATH 101
First Major Exam

Name: _____ ID: _____

Sec: (please circle one)   7 (9:00 - 9:50),   11 (10:00 - 10:50)

Serial #: _____

Problem #		Points
1		40
2		40
3		40
4		40
5		40
Total:		200

1. Find a number δ such that $\mid f(x) - L \mid < \epsilon$ if $0 < \mid x - a \mid < \delta$, when

$$\lim_{x->3} (5x - 2) = 13 \qquad ; \qquad \epsilon = 0.01$$

2. Find:

(a)
$$\lim_{\alpha \to 0} \frac{\sin \alpha - \tan \alpha}{\sin^3 \alpha}$$

(b)
$$\lim_{t \to 0} \frac{\sin t}{t^2 + 5t}$$

3. Consider the equation
$$x^3 - 4x + 1 = 0$$

There is one real root lies inside the interval $[1, 2]$. Approximate this root with an error of at most 0.005.

4. Use the defenition of the derivative to find $f'(x)$ where

$$f(x) = \sqrt{x+1}$$

5. Let $f(x)$ be

$$f(x) = \begin{cases} x + 2 & x < 2 \\ 2k - k^2 & x = 2 \\ (k-2)(x-3) & 2 < x < 6 \\ -k^2 + 4 & x = 6 \\ x + 2 & x > 6 \end{cases}$$

Find all values of k so that $f(x)$ is continous on the closed interval $[2, 6]$.