Kuwait University	Math 101	Date:	March 30, 2005
Dept. of Math. & Comp. Sci.	First Exam	Duration:	75 minutes

Calculators, mobile phones, pagers and all other mobile communication equipment are not allowed

Answer the following questions:

1. Evaluate the following limit, if it exists:

   (a) $\lim_{x\to 2}(x-2)^2\cot^2(x-2)$. (2 pts.)

   (b) $\lim_{x\to 1}(x-1)^2\cos\left(\frac{1}{x-1}\right)$ (2 pts.)

2. Find the vertical and horizontal asymptotes, if any, for the graph of

$$f(x)=\frac{\sqrt{x^2+4}}{x+4}$$ (4 pts.)

3. Classify the discontinuities of

$$f(x)=\begin{cases}\dfrac{x^2+3x+2}{x+2} & \text{, if } x<0,\\[2ex] \dfrac{x+1}{x^2-1} & \text{, if } x\geq 0.\end{cases}$$

   as removable, jump or infinite. (5 pts.)

4. Use the definition of the derivative to find $f'(2)$, where

$$f(x)=\sqrt{x^3+1}.$$ (4 pts.)

5. (a) State the intermediate Value Theorem. (1 pts.)

   (b) Let f be continuous on $[0,1]$ and $0\leq f(x)\leq 1$ for all x. Show that there is a number c in $[0,1]$ with $f(c)=c$. (3 pts.)

6. Find $f'(x)$, where

$$f(x)=\frac{x^2\sin x}{1+\cos x}.$$ (4 pts.)