Kuwait University	Math. 101	April 8, 1993
Mathematics Dept.	First Examination	Duration: 75 minu

Answer all of the following questions. Each question is worth 10 points.

Calculators are not allowed.

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1. (a) Solve the inequality $|8-3x| \geq |2x|$.

   (b) Let f and g be two functions given by $f(x)=\sqrt{x-3}$, and $g(x)=\dfrac{1}{x^2-1}$. Compute $(g \circ f)(x)$ and state the domain of $g \circ f$.

2. (a) Find the equation of the tangent line to the circle $x^2+y^2-4x+6y=0$ at the point $(0,0)$

   (b) Use the definition of the limit to prove that $\lim\limits_{x \to \frac{1}{2}} (-2x+5)=4$.

3. (a) Let the function f be given by

$$f(x)=\begin{cases} \dfrac{\sqrt{2x+3}-\sqrt{x+2}}{x+1} & \text{, if } x>-1 \\ \dfrac{x^2-1}{x^2-x-2} & \text{, if } x<-1 \end{cases}$$

   Show that $\lim\limits_{x \to -1} f(x)$ does not exist.

   (b) Let f and g be two functions defined on $(-\infty,\infty)$. If $0 \leq 2g(x)-f(x) \leq x^2$ for all x and $\lim\limits_{x \to 0} f(x)=6$, then find $\lim\limits_{x \to 0} g(x)$.

4. (a) Find the horizontal and vertical asymptotes (if any) for the function f given by $f(x)=\dfrac{3x|x|}{x^2-1}$.

   (b) Find the solution(s) in $[0,2\pi)$ of the equation $2\sin^2 x-7\sin x+3=0$.

Good Luck