King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 101(17) Class Test 1 Spring 2016(162)

ID#:_____ NAME:_____

(1) Evaluate the limit, if it exists:

(a) $\lim\limits_{x\to -1^+} \frac{|x^2-3x+2|}{x^2-1}$.

(b) $\lim\limits_{x\to 0} \frac{x}{\sqrt{1+3x}-1}$.

(c) $\lim\limits_{x\to +\infty} (\cos(\frac{4}{x})\sin(\frac{5}{x}))$

(d) $\lim\limits_{x\to 0} \frac{|2x-1|-|2x+1|}{x}$.

(e) $\lim_{x\to 1} \frac{\sqrt[3]{x}-1}{\sqrt{x}-1}$.

(f) $\lim_{x\to\infty} \frac{2x+x\cos x}{5x^2-2x+1}$.

(g) $\lim_{x\to-\infty} (-3x+1)^3(2x+1)^2$.

(2) Use the Intermediate Value Theorem to show that the equation $x\ln x = \sin x$ has a solution.

(3) Use the graph of $f(x) = \sqrt{x}$ to find a number δ such that $|\sqrt{x} - 3| < 1$ whenever $|x - 9| < \delta$.

(4) Use the (ϵ, δ) definition of the limit to prove that $\lim_{x \to 5} \frac{-x}{5} = -1$.

(5) The limit $\lim_{x\to\pi} \frac{\cos x+1}{x-\pi}$ represents the derivative of some function f at some number a. State such an f and a. (give a reason to your answer).

(6) Find the equation of the tangent line to $f(x) = \frac{2}{\sqrt{4-x}}$ at $x = 0$.

(7) Given that $f(x) = \begin{cases} x^2 - 1 & -1 \leq x \leq 0 \\ 2x & 0 < x < 1 \\ 1 & x = 1 \\ -2x + 4 & 1 < x \leq 2 \\ 0 & 2 < x \leq 3 \end{cases}$

Find all points in $[0, 3]$ where f is discontinuous. Determine if the discontinuity is removable.

(8) Let $f(x) = \frac{-x+2}{\sqrt{x^2-4}}$. Using the concept of limit, find
(a) all horizontal asymptotes (if any)

(b) all vertical asymptotes (if any)