King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 101(22 & 31) Class Test 1 Fall 2016(161)

ID#:_____ NAME:_____

(1) Evaluate the limit, if it exists:

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

(b) $\lim\limits_{x\to 2} \sqrt{\frac{x^4-16}{x^2-x-2}}$

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

(d) $\lim_{x \to 1} \frac{5}{1-x}$.

(e) $\lim_{x \to 0^+} \frac{3}{x}(\frac{1}{4+x} - \frac{1}{4-x})$.

(f) $\lim_{x \to -2} \frac{\frac{1}{x}+\frac{1}{2}}{x^3+8}$.

(g) $\lim_{x \to 2^-} ([[x-1]] - x^2)$, where $[[.]]$ denotes the greatest integer function.

(2) Use the Intermediate Value Theorem to show that the equation $x^2 - \cos(\pi x) = 4$ has a solution.

(3) Use the graph of $f(x) = \frac{1}{x}$ to find a number δ such that $|\frac{1}{x} - \frac{1}{3}| < \frac{1}{5}$ whenever $|x - 3| < \delta$.

(4) Let $f(x) = 3x + 1$. Find the largest value of δ such that $|f(x) - 7| < 0.01$ whenever $-\delta < x - 2 < \delta$.

(5) Find the equation of the tangent line to $f(x) = x - \frac{1}{x}$ at $x = 3$.

(6) Find all values of a and b that makes the function

$$f(x) = \begin{cases} \text{x}^2 - a & \text{if } x < 1 \\ \text{a+bx} & 1 \leq x \leq 2 \\ \text{b-x}^3 & \text{if } x > 2 \end{cases}$$

continuous on the real line. (Use limits to justify your steps)

(7) If $x^3 - x + 4 \leq x + f(x) \leq 3x^2 + 1$ for all real number x, then find $\lim_{x \to -1} f(x)$. (Given reasons to your steps)

(8) Where is the function $f(x) = \frac{1}{1 - e^{\frac{x-1}{x}}}$ continuous?

Dr. M. R. Alfuraidan