King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
Instructor: Khaled Furati

MATH 311 - Exam 2 - Term 141

Duration: 90 minutes

Student Name:

1. Define the following.
   (a) Continuity of a function at a point.
   (b) Uniformly continuous function on an interval.
2. Let f, g be defined on $A \subseteq \mathbb{R}$ to $\mathbb{R}$, and let c be a cluster point of A. Suppose that f is bounded on a neighborhood of c and that $\lim_{x\to c} g = 0$. Prove that $\lim_{x\to c} fg = 0$.
3. Show that the function
$$f(x) = \begin{cases} x\sin(1/x), & x \neq 0, \\ 0, & x = 0, \end{cases}$$
is continuous at every point $c \in \mathbb{R}$.
4. Let $g : \mathbb{R} \to \mathbb{R}$ be a positive function such that $g(0) = 1$ and $g(x+y) = g(x)g(y)$ for all x, y in $\mathbb{R}$. Show that if g is continuous at $x = 0$, then g is continuous at every point of $\mathbb{R}$.
5. Let $f : [a, b] \to \mathbb{R}$ be increasing on $[a, b]$ and $f(a) = \inf\{f(x) : x \in (a, b)\}$. Show that f is continuous at a.

Question Number	**Points**	**Maximum Points**
1		10
2		10
3		10
4		10
5		10
Total		50