BAHRIA UNIVERSITY, (Karachi Campus)

Department of Software Engineering

Assignment 2 - Fall 2022

COURSE TITLE:	**Calculus and Analytical Geometry**	COURSE CODE:	**GSC-110**
Class:	**BSE-I (B)**	Shift:	**Morning**
Course Instructor:	**MR. DANIYAL UR REHMAN**	Time Allowed:	**1.5 Week**
Submission Date:	**20-11-2022**	Max. Marks:	**5 Marks**

Question No. 1 **[CLO1: 5 Marks]**

Graph the following functions

i) $f(x) = \begin{cases} 2x, & 0 \le x \le 1 \\ 2 + x, & 1 < x \le 2 \end{cases}$

ii) $f(x) = \begin{cases} x^2 + 2, & 0 \le x \le 1 \\ 1 - x, & 1 < x \le 2 \end{cases}$

iii) $f(x) = 3 + |x + 2|$

iv) $f(x) = 2 - |x - 1|$

Question No. 2

Write formula for piecewise define function

i) From $(-1,-1)$ to $(0,0)$ and from $(0,0)$ to $(1,-1)$

ii) Find limit of the function in (i) at $x = 0$

Question No. 3

- If $f(x) = \sqrt{x}$ and $g(x) = 2 + x$ find fog, gog, fof and gog
- Finding the limit I. $\lim\limits_{x \to \frac{\pi}{2}} \frac{(1 - sinx)}{cotx}$ II. $\lim\limits_{x \to \frac{\pi}{2}} \frac{sinx}{x^2}$

Question No. 4

- Find the derivatives of the following functions. Using the Rules of Derivative.
  - i. $y = (x^2 + 1)(x^3 + 3)$
  - ii. $y = \sqrt[3]{3x + 4}$
  - iii. $y = e^x(e^{2x} + 1)$
  - iv. $y = \frac{Sinx + Cosx}{Sinx - Cosx}$

- Use implicit differentiation to find dy/dx

i. $2xy + y^2 = x + y$

ii. $x + \tan(xy) + 3x = 0$

Question No. 5a

Find the equation of tangent and normal to the curves

i. $y = 1 + cosx$ at $(\frac{\pi}{2}, 1)$

ii. $xy + 2x - 5y - 2 = 0$ at $(3,2)$

Question No. 5b

Find the linearization's of the following functions

$$f(x) = x + \frac{1}{x}, \quad a = 1$$

$$f(x) = \sqrt[3]{x}, \quad a = -8$$

$f(x) = \sin x$ at (a) $x = 0$, (b) $x = \pi$

$f(x) = \cos x$ at (a) $x = 0$, (b) $x = -\pi/2$

$f(x) = \sec x$ at (a) $x = 0$, (b) $x = -\pi/3$

$f(x) = \tan x$ at (a) $x = 0$, (b) $x = \pi/4$