ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD.

(Department of Mathematics)

1. PLAGLARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.
2. SUBMITTING ASSIGNMENT(S) BORROWED OR STOLEN FROM OTHER(S) ONE'S WILL BE PENALIZED AS DEFINED IN "AIOU PLAGLARISM POLICY"

Course: Pre-Calculus I (3517) **Semester: Autumn, 2025**
Level: BS (Data Science) **Total Marks: 100**
Pass Marks: 50

Assignment No. 1
(Units 1-4)

Note: Attempt all questions and each question carries equal marks.

Q # 01 **(10+10)**

(a) Show that $f(x) = sinx$ is bounded and periodic.

(b) Identify discontinuity in $f(x) = \frac{x+2}{x-3}$ and state its type.

Q # 02 **(10+10)**

(a) Determine the remainder when $2x^4 - 3x^3 + x - 5$ is divided by $x - 4$.

(b) Explain why $\frac{(x+1)(x-3)}{(x-3)} = x + 1$ has a hole in its graph.

Q # 03 **(10+10)**

(a) Compare the domains of $(f\ o\ g)(x)$ and $(g\ o\ f)(x)$ where $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x}$.

(b) Find the inverse of $f(x) = \frac{x-1}{x+2}$.

Q # 04 **(10+10)**

(a) Show that every polynomial is continuous on $\mathbb{R}$.

(b) Is $f(x) = tan(x)$ continuous at $x = \frac{\pi}{2}$?

Q # 05 **(10+10)**

(a) Find the domain and range of the inverse function $f(x) = \frac{1}{x+2}$.

(b) If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$. Verify $(A \cup B)' = A' \cap B'$.

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Assignment No. 2
(Units 5-9)

Total Marks: 100
Pass Marks: 50

Note: Attempt all questions and each question carries equal marks.

Q # 01

(a) Use Cramer's rule to solve: $3x + 2y = 11,\ 4x - y = 5.$

(b) Solve the system of equations using Gaussian elimination: $x + 2y + 3z = 9$, $2x + 3y + z = 8$, $3x + y + 2z = 7$.

Q # 02

(a) Find the 20^{th} term of the arithmetic sequence 12, 19, 26, 33, . . .

(b) Find the sum of the infinite series 8, 4, 2, 1, . . .

Q # 03

(a) Solve the triangle ABC if $a = 8$, $b = 6$, and $<C = 60^\circ$ using the Law of Cosine.

(b) Draw the graphs of *sin* (x) and *cos* (x) for $0 \leq x \leq 2\pi$. Mark their amplitudes, periods, and zeros clearly.

Q # 04

(a) For the parabola $x^2 = -20y$, determine the following:
(i) Focus (ii) Directrix (iii) Equation of the axis

(b) Write the equation of a circle that passes through the origin and has its center at (2, -3)

Q # 05

(a) Sketch the polar curve defined by $r = 1 + cos\theta$. What type of curve is this, and about which axis is it symmetric?

(b) For the parametric motion $x = cos\ (t)$, $y = sin\ (t)$, find the arc length traced from $t = 0$ to $t = \pi$. Use the arc length formula for parametric curves.