

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 (Math-3001)

Level: BS (Data Science)

Semester: Autumn, 2025

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 $f(x) = \sin x$ 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 $(f \circ g)(x)$ and $(g \circ f)(x)$ 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 20th 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 $\angle C = 60^\circ$ 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.