

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD.

Department of Mathematics

WARNING

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 PENLIZED AS DEFINED IN "AIU PLAGLARISM POLICY"

Course: Pre-Calculus (4431)

Level: BS

Semester: Spring-2026

Total Marks: 100

Passing Marks: 50

Assignment No. 1

(Unit 1-5)

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

Question # 01

(6+8+6=20)

- (a) Represent the following real numbers on the Real line.
 - i) 1.5
 - ii) $\sqrt{5}$
 - iii) $1.\bar{9}$
- (b) Prove that if n is any positive integer, then $\sqrt{n} + \sqrt{2}$ is irrational.
- (c) Find a rational number between the rational numbers $\frac{a}{b}$ and $\frac{c}{d}$.

Question # 02

(8+6+6=20)

- (a) Use a Venn diagram to verify the following:
 - (i) $(A - B) \cup B = A \cup B$,
 - (ii) $A \cap B' = A$ iff $A \cap B = \phi$.
- (b) Determine whether the given functions are even or odd:
 - (i) $f(x) = \frac{x^3 - x}{x^2 + 1}$,
 - (ii) $f(x) = x\sqrt{x^2 + 5}$.
- (c) Find the domain of the following functions:
 - (i) $\frac{x}{3x-1}$,
 - (ii) $|2x + 1|$.

Question # 03

(5+5+10=20)

- (a) Solve the equation $e^{2x+3} - 7 = 0$.
- (b) Simplify the expression $\tan(\sin^{-1} x)$.
- (c) Find the limit: $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$.

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD.
Department of Mathematics

Question # 04

(5+5+5+5=20)

Find the limit of the following functions:

(i) $\lim_{x \rightarrow 0} \frac{\sqrt{x+4}-2}{x}$

(ii) $\lim_{x \rightarrow 0} \frac{\tan 3x}{\tan 5x}$

(iii) $\lim_{x \rightarrow 5^+} \ln(x-5)$

(iv) $\lim_{x \rightarrow 1^-} \frac{1}{x^3-1}$

Question # 05

(10+10=20)

(a) Evaluate:

(i) $\lim_{x \rightarrow 0} \frac{e^{\frac{1}{x}}-1}{\frac{1}{e^x+1}}, x < 0$

(ii) $\lim_{x \rightarrow 0} \frac{e^{\frac{1}{x}}-1}{\frac{1}{e^x+1}}, x > 0$

(b) Prove that if A, B, C are finite sets, then

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|.$$

Assignment No. 2
(Unit 6-9)

Total Marks:100
Passing Marks: 50

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

Question # 01

(10+10=20)

(a) Find the values of the constant k and m , if possible, that will make the function f continuous everywhere.

$$f(x) = \begin{cases} x^2 + 5, & x > 2 \\ m(x + 1) + k, & -1 < x < 2 \\ 2x^3 + x + 7, & x \leq -1 \end{cases}$$

(b) Determine whether the statement is true or False. Explain your answer:

(i) If $f(x)$ is continuous at $x = c$, then so is $|f(x)|$.

(ii) If $|f(x)|$ is continuous at $x = c$, then so is $f(x)$.

(iii) If f and g are discontinuous at $x = c$, then so is $f + g$.

(iv) If $f(x)$ is continuous at $x = c$, then so is $\sqrt{f(x)}$.

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD.

Department of Mathematics

Question # 02

(8+6+6=20)

- (a) The sum of the 6th and 8th terms of an Arithmetic Progression (A.P) is 40, and the product of the 4th and 7th terms is 220. Find the arithmetic progression (A.P).
- (b) Find the sum of the 20 terms of the series whose n th term is $3n + 1$.
- (c) If 5 and 8 are two arithmetic means between a and b , find a and b .

Question # 03

(10+10=20)

- (a) A man borrows Rs. 32760 without interest and agrees to repay the loan in installments, each installment being twice the preceding one. Find the amount of the last installment, if the amount of the first installment is Rs. 8.
- (b) Find an equation of the tangent line to the parabola $y = x^2 - 8x + 9$ at the point $(3, -6)$.

Question # 03

(5+5+10=20)

- (a) Find $f'(a)$ if $f(x) = 3 - 2x + 4x^2$.
- (b) Determine whether $f'(0)$ exists.

$$f(x) = \begin{cases} x \sin \frac{1}{x}, & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$

- (c) Find the derivative of the function by using the definition of derivative. State the domain of the function and the domain of its derivative.

$$f(x) = 1 - 3x^2.$$

Question # 04

(10+10=20)

- (a) Find the integral $\int (\cos x - 2 \sin x) dx$.
- (b) Find $f'''(x)$ if

$$f(x) = \frac{(2x^2 - 1)(x^2 + 3\sqrt{x})}{x^3 + 2\sqrt{x}}$$

Question # 05

(12+8=20)

- (a) Evaluate the definite integral:

i) $\int_0^{\frac{\pi}{4}} \sin^4 t dt$ ii) $\int_{-1}^5 |x + 1| dx$ iii) $\int_{-1}^1 \frac{x}{1+x^5} dx$

- (b) Find the area between the x-axis and the curve $y = \cos 2x$ from $x = 0$ to $x = \frac{\pi}{4}$.