940/941
C: 115

Air University
(Mid-Term Examination: Fall-2024)

Subject:	**Calculus & Analytical Geometry**	Total Marks:	**50**
Course Code:	**MA-110**	Date:	
Class:	**BS-CYS**	Time:	
Semester:	**III**	Duration:	**2 Hours**
Section:	**A, B (Morning Session)**	FM Name:	**Mr. Umair Habib**
HoD's Signature:		FM's Signature:	

Note:

- **All questions must be attempted. Understanding the question is part of the examination.**
- **This examination carries 25% weight towards the final grade.**
- **Scientific calculator is allowed.**

Q. No. 1 (CLO-1) (PLO-2)		**10 Marks**
a	**Recognize** (find) the domain and range of the function $y = \|x + 2\| - 2$	4
b	Sketch the graph of the function $y = -2(x + 1)^2 - 3$ **NOTE: Show all the graphs for the final version.**	6
Q. No. 2 (CLO-2) (PLO-2)		**20 Marks**
a	**Discuss** the limit by making a guess (if it exists) by evaluating the function at the specified *x-values*. $\lim_{x \to 1^+} \frac{x+1}{x^3-1}, x = 1.5, 1.1, 1.01, 1.001, 1.0001$	5
b	**Interpret (find)** the limit $\lim_{x \to +\infty} \frac{\sqrt{3x^4 + x}}{x^2 - 8}$	7
c	**Explain** (prove) that the function $f(x) = \sqrt{9 - x^2}$ is continuous on the closed interval $[-3, 3]$.	8
Q. No. 3 (CLO-4) (PLO-3)		**20 Marks**
a	**Apply** the definition of the derivative to find $f'(x)$, and then find the equation of the tangent line to the graph of $y = \sqrt{2x + 1}$ at $x = 4$.	7
b	**Solve** for $g'(3)$ given that $f(3) = -2$ *and* $f'(3) = 4$ if $g(x) = \sqrt{x} f(x)$.	7
c	**Investigate** $\frac{dy}{dx}$ for $x^3 + y^3 = 3xy^2$	6

********** End **********