



COMSATS University Islamabad
Department of Computer Science
Mid-Term Exam

Course Title:	Calculus and Analytical Geometry	Course Code:	MTH104	Credit Hours:	30
Course Instructor/s:	Dr. M. Bilal Ashraf	Program Name:		Date:	
Semester:	Batch:	Section:		Maximum Marks:	25
Time Allowed:	90 mins				
Student's Name:	Aleeza Maryam		Reg. No.	FA21-ISA1-003	

Q. 1: Prove that every continuous function is not differentiable?

Q. 2: Is $f(x) = \begin{cases} \frac{\sin x}{|x|}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ continuous at $x = 0$?

Q. 3: Find out the points where the graph of the function $y = x^3 - 3x + 4$ have a horizontal tangent line

Q. 4: Let $f(x) = \begin{cases} x^2 - 1, & x \leq 1 \\ k(x-1), & x > 1 \end{cases}$

For what values of k is f

(i) continuous?

(ii) differentiable?

Q. 5: Show that $y = \cos x$ and $y = \sin x$ are the solutions of the equation $y'' + y = 0$.

Q. 6: (i) Use implicit differentiation to find $\frac{dy}{dx}$ for the equation $x^3 + y^3 = 3xy$.

(ii) Find an equation for the tangent line to $x^3 + y^3 = 3xy$ at the point $\left(\frac{3}{2}, \frac{3}{2}\right)$.

(iii) At what points in the first quadrant is the tangent line to $x^3 + y^3 = 3xy$ horizontal?