



COMSATS University Islamabad (CUI)
Islamabad Campus
MID Term Exam, FALL 2025

Program: BDS-3

Subject: MTH-105, Calculus & Analytical Geometry

Date: October 31st, 2025.

Total Marks: 25

Maximum time: 1 hr & 20 min

Instructor: Dr. Javeria Nawaz Abbasi

Question #1:

Find inverse if exists

$$f(x) = \frac{1}{3 + \tan^{-1}(x)}.$$

Question #2:

Find dy/dx by implicit differentiation.

$$\tan^3(xy^2 + y) = x$$

Question #3:

Find the limit

$$\lim_{y \rightarrow 4} \frac{4 - y}{2 - \sqrt{y}}$$

Question #4:

Show that

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

is continuous but not differentiable at $x = 0$. Sketch the graph of f near $x = 0$.

Question #5:

Find the values of x at which the curve $y = f(x)$ has a horizontal tangent line.

$$f(x) = \frac{(x - 3)^4}{x^2 + 2x}$$

Good Luck