



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Summer 2026

Course Code: MAT101; Course Title: Mathematics I

Batch: 47; Section: A-H; Teachers Initial: MMH, SST, AMS

Time: 1 Hour 30 Minutes

Marks: 25

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially]

1.	Explain the followings: a. Function with a suitable example b. Geometrical meaning of differentiation c. Concept of homogeneous function	3×1=3	
2.	a. Compute the domain and range of the following function $f(x) = \sqrt{3x + 10}$ b. Express the following function graphically, and comment about its domain and range from the graph. $f(x) = \begin{cases} x^2 - 1 & ; x < -1 \\ -\sqrt{1 - x^2} & ; -1 \leq x < 1 \\ x & ; x \geq 1 \end{cases}$ c. Express the following absolute value function into a piecewise function $f(x) = 2x + 1 - x - 5 + x $	2 3 2	CLO-1 L-2
3.	a. Compute $\frac{dy}{dx}$ for $y = (\tan x)^{\cot x}$ b. Compute the derivative of $y = \sin(\ln x) e^{\cos x}$ c. Compute the derivative of $x^{\ln \sqrt{e^{\cos^{-1} x}}} + e^{2x}$ with respect to $\tan^{-1} \frac{x}{\sqrt{1-x^2}}$ d. If $y = \frac{1}{a^n x + b^n}$ then calculate the n-th derivative of y, also compute y_{12} e. If $u = \cos^{-1} \left(\frac{x+y}{\sqrt{x} + \sqrt{y}} \right)$ then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{1}{2} \cot u = 0$	5×3=15	CLO-2 L-3