



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Fall 2026

Course Code: MAT101; Course Title: Mathematics I

Batch: 48; Section: A-O; Teachers Initial: MMH, ZT, MSIM, NDP, MMK

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.	<p>Explain the followings:</p> <p>a. Bijective Function, it's condition with a suitable example.</p> <p>b. Geometrical meaning of differentiation.</p> <p>c. The concept of limits for a real-valued function $f(x)$.</p>	1 1 1	
2.	<p>a. Compute the domain and range of the following function</p> $g(x) = \frac{2x + 1}{5x + 6}$ <p>b. Express the following function graphically, and comment about the region which can't be the range from the graph.</p> $f(x) = \begin{cases} x^2 - 1 & ; x < 0 \\ x & ; 0 \leq x < 1 \\ \frac{2}{x} & ; x \geq 1 \end{cases}$ <p>c. Express the following absolute value function into a piecewise function</p> $f(x) = x - 1 + 2x + 1 + x $	2 3 2	CLO-1 L-2
3.	<p>a. Compute the continuity of the following function at $x = \frac{\pi}{2}$,</p> $f(x) = \begin{cases} 1 + \sin x & ; x < \frac{\pi}{2} \\ 2 + \left(x - \frac{\pi}{2}\right)^2 & ; x \geq \frac{\pi}{2} \end{cases}$ <p>b. Compute $\frac{dy}{dx}$ for $(\cos x)^y = (\sin y)^x$</p> <p>c. Compute $\frac{dy}{dx}$ for $y = x^x + (\sin x)^{\ln \sqrt{x}}$</p>	3 3 3	CLO-2 L-3

d. Compute the derivative of $x^{\ln \sqrt{a^{\cos^{-1} x}}} + a^{2^x}$ with respect to $\cot^{-1} \frac{x}{\sqrt{1-x^2}}$	3	
e. If $y = (ax + b)^n$ then calculate y_n , y_s , and y_p where, $s < n$ and $p > n$.	3	

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