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Daffodil International University

Faculty of Science & Information Technology

Department of Computing and Information System

Mid-Term Examination, Summer-2026

Course Code: MAT 101, Course Title: Mathematics I

Level: 1 Term: 2

Exam Duration: 1.5 Hours **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.	*a)*	i) **Define** function with example. ii) **Compute** the domain and range of the function $f(x) = \frac{4x+9}{3-5x}$	[2 Marks] + [2 Marks]	CO-1
	b)	**Express** the function $y = \|x\| + 3$ graphically.	[2 Marks]	
2.	*a)*	i) **Define** rational number with example. ii) **Compute** the value of x for which $\sqrt{1+\frac{x}{144}} = \frac{13}{12}$.	[1 Marks] + [2 marks]	CO-1
	b)	i) **Define** complex number with example. ii) **Convert** the complex number $\frac{4+5i}{3-2i}$ into the form $a + ib$.	[1 Marks] + [2 marks]	
3.	*a)*	**Compute** the solution set for the inequality $\|2x - 5\| < 3$.	[2 Marks]	CO-2
	b)	**Calculate** the values of k for which the equation $x^2 - 4x - 1 - 2k(x-5) = 0$ has two real equal roots.	[5 Marks]	
4.	*a)*	**Define** the continuity of a function.	[1 Marks]	CO-3
	b)	A function $f(x)$ is defined as follows $f(x) = \begin{cases} x^2 & ; x < 1 \\ 2.5 & ; x = 1 \\ x^2 + 1 & ; x > 1 \end{cases}$ **Determine** whether the limit of $f(x)$ exists at the point $x = 1$.	[2 Marks]	
	c)	A function $f(x)$ is defined as follows $f(x) = \begin{cases} -x^2 & ; x \le 0 \\ 5x - 4 & ; 0 < x \le 1 \\ 4x^2 - 3x & ; 1 < x < 2 \\ 3x + 4 & ; x \ge 2 \end{cases}$ **Determine** whether $f(x)$ is continuous or not at $x = 1$.	[3 Marks]	