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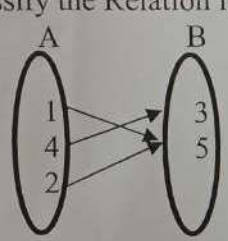
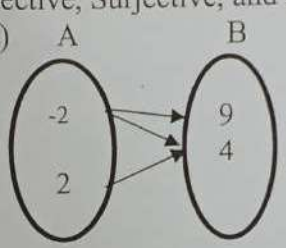
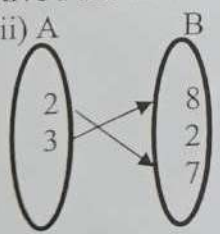
Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid-Term Examination, Spring 2026
Course Code: MAT101, Course Title: Mathematics I
Level: L1 Term: T1 Batch: 71

Time: 01:30 Hrs **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)***	Classify the Relation is an Injective, Surjective, and Bijective Function: i)  ii)  iii) 	**2**	**CO1**
	b)	Demonstrate the Differentiability of the following function at the point $x=0$ $f(x)=\begin{cases} x^2\sin\left(\frac{1}{x}\right); x\neq 0 \\ 0; x=0 \end{cases}$	**3**	
	c)	Explain function with example. If $f(x)=\ln x; x\geq 0$ then Demonstrate the inverse of $f(x)$.	**2**	
2.		Demonstrate the solution of the inequality $\frac{x^2-4x+4}{x^3+8x^2+15x}\geq 0$ using sign table.	**3**	**CO1**
3.		State the Factor Theorem. Apply the Remainder Theorem to solve the following polynomial equation $2x^4+6x^3-2x^2-39x-18=0$	**5**	**CO2**
4.	***a)***	Inspect the rate of change of y with respect to x, or $\frac{dy}{dx}$ of the function $(\cos x)^y=(\sin y)^x$.	**3**	**CO3**
	b)	A bike rider riding a bike on a hill road, if the equation of path is $y=x^2 10^x\sin x+(x)^{e^{\ln x}}$ then, Inspect the slope of the path at $x=2$	**4**	
	c)	If $y=\sin^{-1}\left(\cos\left(e^{\ln x}\right)\right)$ and $z=\ln\left(x+\sqrt{x^2+1}\right)$ then, Inspect the rate of change of z with respect to y, or $\frac{dz}{dy}$.	**3**	

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