



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Fall 2025

Course Code: MAT101

Course Title: Mathematics I

Batch: 45; Section: All

Teachers Initial: MMR (AKA), DMMK, DK, HSA, NRA, AAR

Time: 2 Hours

Marks: 40

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 following terms a. Condition of a function to have maximum & minimum values. b. Condition of a function to have inflection point.	2.5 × 2.5 = 5	CLO-1 L-2
2.	Compute the maximum and minimum values of $y = x^6 - 12x^5 + 36x^4 + 4$ Also, identify the critical points and inflection points (if any), of the above function.	6 + 2 + 2 = 10	
3.	Calculate the followings: a. $\int \frac{(1+x)e^x}{\cos^2(xe^x)} dx$ b. $\int \sin^4 x dx$ c. $\int_0^{\frac{\pi}{2}} \sin 2x \sin x dx$ d. $\int_0^2 \int_0^z \int_0^{x\sqrt{3}} \frac{x}{x^2+y^2} dy dx dz$ e. $\int_0^1 x^4 (1-x)^{\frac{3}{2}} dx$	5 × 3 = 15	CLO-2 L-3
4.	a. Calculate the area of the circle $x^2 + y^2 = a^2$ b. Calculate the area of the region enclosed by the curve $y^2 = 4ax$ from $x = 0$ and $x = a$.	6 4	CLO-3 L-4

3.5