

Multivariable Calculus (MT2008)

Date: 2 November 2024

Course Instructor

Muhammad Yaseen

Sessional-II Exam

Total Time (Hrs): 1

Total Marks: 30

Total Questions: 2

Roll No

Section

Student Signature

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Attempt all the questions.

CLO #2.

Q1: (a). Find the directional derivative of the function $f(x, y) = x^2y^3 - 4y$ at the point $(2, -1)$ in the direction of the vector $\mathbf{v} = 2\mathbf{i} + 5\mathbf{j}$.

(b). Find the shortest distance from the point $(2, 0, -3)$ to the plane $x + y + z = 1$. [4 + 6 marks].

CLO #3.

Q2: (a). Sketch the region of Integration and then evaluate the given Integral

$$\int_1^2 \int_0^{\sqrt{2x-x^2}} \frac{1}{(x^2 + y^2)^2} dy dx$$

(b). Find the Jacobian for triple integration in spherical coordinates.

$\rho \sin \theta$

(c). Sketch the part of the paraboloid $z = x^2 + y^2$ that lies below the plane $z = 9$, and then find the area of the shaded region.

[10 + 5 + 5 marks]