Bahria University
Discovering Knowledge

Multivariable Calculus

BSCS Semester III

Department of Computer Science
Bahria University, Lahore Campus

Assignment:3

Deadline: Week 10, 23 May 2023

Evaluation of CLO	Question Number	Marks	Obtained Marks
CLO1: CLO statement Comprehend the basic concepts and techniques of differential and integral calculus of functions of several variables.	1,2	20	
CLO3: CLO statement Analyze the given problems and apply integrals to compute physical quantities like area/volume.	3,4	20	
Total Marks		40	

Question 1. The quantity of a product demanded by consumers is a function of its price. The quantity of one product demanded may also depend on the price of other products. For example, the demand for tea is affected by the price of coffee; the demand for cars is affected by the price of gas. The quantities demanded, q_1 and q_2, of two products depend on their prices, p_1 and p_2, as follows:

$$q_1 + 3.5\, p_1 - 0.8\, p_2 = 517$$
$$q_2 + 4.4\, p_2 - 1.4\, p_1 = 770.$$

If one manufacturer sells both products, how should the **prices** be set to generate the maximum possible revenue? What is that maximum possible revenue?

Question 2. A rectangular box without a lid is to be made from $12m^2$ of cardboard. Find the maximum volume of such a box.

Question#3

i. Find the volume of the solid lying between the function $f(x,y) = 7xy^2$ and the region bounded by $x = y$ & $x = \sqrt{y}$.

ii. Find $\iint_R x \, dA$, where the region R enclosed between the curves $y = 4x^3 - x^4$ and $y = 3 - 4x + 4x^2$.

Question#4

i. $\int_C yzdx - xzdy + xydz$, $C: x = e^t, y = e^{3t}, z = e^{-t}, 0 \leq t \leq 1$.

ii. $\int_C x^7 y^3 ds$, $C: x = \cos^3 t, y = \sin^3 t, 0 \leq t \leq \frac{\pi}{2}$.