



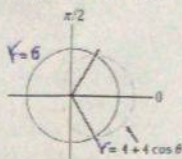
COMSATS University Islamabad
Department of Computer Science
Midterm Exam Spring 2022

Program : BCS-III
Teacher: Dr. M. Yousaf
Subject: Multivariable Calculus

Total Marks : 25
Time Allowed: 1 hr & 30 min
Date 10-05-2022

Attempt all questions

Q. 1 Find the area of the shaded region inside the cardioid and outside the circle.



Q. 2 Find an equation of the sphere with center $(2, 1, -3)$ that is tangent to the plane

$$x - 3y + 2z = 4$$

Q. 3 Use a scalar triple product to find the volume of the parallelepiped that has u , v , and w as adjacent edges. $u = \langle 2, -6, 2 \rangle$, $v = \langle 0, 4, -2 \rangle$, $w = \langle 2, 2, -4 \rangle$.

Q. 4 Find an arc length parametrization of the curve that has the same orientation as the given curve and for which the reference point corresponds to $t = 0$.

$$r(t) = (3 \cos t)i + (3 \sin t)j + (t)k, \quad 0 \leq t \leq 2\pi.$$

Q. 5 Determine whether $f(x, y) = \begin{cases} \frac{x^2 + y^2}{\sqrt{x^2 + y^2}} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$ is continuous at the origin.