National University

of Computer & Emerging Sciences Peshawar Campus

Program: BS (SE & AI)
Semester: Fall-2022
Course: MT1003-Calculus & Analytical Geometry

Examination: Assignment # 04
Total Marks: 10, Weightage: 2.5
Date of Submission: 13 / 12 / 2022

Note: Attempt all questions.

Q1. Use integration by parts to prove the reduction formula

$$\int (\ln x)^n dx = x(\ln x)^n - n\int (\ln x)^{n-1} dx$$

Q2. The velocity v of blood that flows in a blood vessel with radius R and length l at a distance r from the central axis is

$$v(r) = \frac{P}{4\eta l}(R^2 - r^2)$$

where P is the pressure difference between the ends of the vessel and η is the viscosity of the blood. Find the average velocity (with respect to r) over the interval $0 \le r \le R$.

Q3. Determine whether the the following integral is convergent or divergent.

$$\int_2^{\infty} \frac{dv}{v^2 + 2v - 3}$$

Q4. Find the area of the region bounded by the parabola $y = x^2$, the tangent line to this parabola at $(1,1)$, and the x-axis.

The End