National University of Computer & Emerging Sciences, Karachi
Department of Computer Science
Assignment 3

Course: Calculus and Analytical Geometry	Course Code: MT 1003
Semester: Spring Section: BCS 1E/F/H	Instructor Name: Shahid Ashraf

Q1 Let R be the bounded region enclosed by the curves $y = x$ and $y = 2x^2 - 1$. We rotate R around the x-axis. Compute the volume of the resulting solid.

Notes: Careful! The region intersects three quadrants. The axis of rotation cuts across the region, and you need to figure out what does to the solid. The difficulty of this problem is the set up. The volume can be written as an integral (or a sum of integrals) of polynomials. Make sure you explain all the process to get it to that form. If you get it to that form, you do not need to perform the integration in detail. You may jump directly from that expression to the final answer

Q2 Use the divergence test to determine whether the infinite series,

$$\sum_{k=1}^{\infty} \frac{\sqrt{k}}{\sqrt{k^2+1}}$$

converges or diverges, or if the test yields no conclusion.

Q3 Consider the infinite series

$$\sum_{k=0}^{\infty} -ke^{-k}$$

Determine whether it is convergent using the integral test.