

Q-1- The base of the solid is the region bounded by $x+2y=2$, $x=0$, and $y=0$.

Find the volume of the solid whose cross- sections perpendicular to the x - axis are semi- circles with diameter on the base. (4 pts.)

Q-2- Find the length of the curve $y = (x-1)^{\frac{2}{3}}$, $1 \leq x \leq 9$. (4 pts.)

Q-3- Find the volume of the solid obtained by revolving the region bounded by the curves $y = \sin^{-1}$, the x -axis and $x=1$ about y -axis. (4pts)

Q-4 Test for convergence: (8pts.)

(a) $\sum_{k=1}^{\infty} \frac{3^k}{(2k-1)!}$

(b) $\sum_{k=1}^{\infty} \frac{k^3}{4k^2+1} \sin \frac{1}{k}$

(c) $\sum_{k=1}^{\infty} \frac{\sqrt{k}}{2k^2-1}$

(d) $\sum_{k=2}^{\infty} \frac{\ln k}{k\sqrt{k}}$

Q-5- Find the sum of the following series:

(a) $\sum_{k=3}^{\infty} \left(\frac{1}{2}\right)^{k+1}$ (2pts).

(b) $\sum_{k=2}^{\infty} \ln\left(1 - \frac{1}{k^2}\right)$ (3pts).

Q1. Sketch the graphs of $r=2\cos\theta$ and $r=2-2\cos\theta$. Find the area of the region inside the circle and outside the cardioid>

Q2. Find the slope of the tangent line to the graph of $r=2-2\cos\theta$.

At $\theta = \frac{\pi}{6}$.

Q3. Given $P(2.3, -1)$, $Q(0.2, 1)$, $R(-1.0, 3)$ and $S(3.2, -1)$ are points in space. Find whether those points are coplanar.

Q4. Find the point of intersection of the line

$$L: x = 2 - t, y = 1 + 3t, z = 2t$$

and the plane

$$PL: 3x + y - 2z = 13.$$

Q5. Find the equation of the plane containing the line

$L: x = 2 - t, y = 1 + 3t, z = 3 - 2t$, and orthogonal to the plane

$$PL: 3x + y - 2z = 13.$$

Q6. Find parametric equations of the line tangent to the graph

Of $r(t) = t^3i + Intj + e^{-1}k$ at $t_0 = 1$.

Q7. Represent the vector valued function

$$r(t) = \sqrt{7}e^t i + 3\sin e^t k, t \geq 0,$$

in terms of the arclength s as a parameter.