

1) Compute the following integrals:

(a) $\int \frac{d\theta}{4\sin\theta - 3\cos\theta}$, (b) $\int \frac{x dx}{x^3 + 1}$, (c) $\int_0^1 \frac{x^2 + 1}{x^2 - 1} dx$

2) a) The region bounded by the curves $x - y = 0$, $y - 2x = 0$ and $y = 1$ is revolved about the y -axis. Find the volume of the solid of revolution.

b) Find the length of the curve $y = x^4 + (32x^2)^{-1}$ from $x = 1$ to $x = 2$.

3) Determine convergence of the following series:

(a) $\sum_1 \left(\frac{2}{k^2 + k} - \frac{3}{5k} \right)$, (b) $\sum_0 \frac{(n!)^2}{(3n!)} \cdot 2^n$

4) (a) Find the radius of convergence of $\sum_0 \frac{3^k x^k}{k!}$

(b) Find the area of the region that is inside the circle $r = \sin\theta$ and outside the cardioid $r = 1 - \cos\theta$.

5) (a) Find the equation of the plane through the point $(1, -1, 2)$ and having normal $n = i - 3j + 2k$. Also sketch the graph of plane in space.

(b) Find $u \cdot (v \times w)$ where $u = 2i + j + 3k$,
 $v = 3i - 5j + k$, $w = i + 7j + 4k$.

Good Luck.