

Exam for Graduation

[May 2015-Calculus]

1. Find the following series' radius and interval of convergence.

(a) $\sum_{n=1}^{\infty} \frac{3^n x^n}{n}$;

(b) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} n x^n}{(n^2 + 1) \ln(n^2 + 1)}$.

2. Find the points on the surface $2x^2 - 2y^2 + 2z - 1 = 0$ that are closest to the origin.
3. Find the area of the cap cut from the sphere $x^2 + y^2 + z^2 = 5$ by the paraboloid $z = x^2 + y^2 + 1$.