

For all the series, find the values of x for which the series converges. Find the sum of the series for those values of x if the series is geometric.

1.
$$\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{5^n}$$

2.
$$\sum_{n=0}^{\infty} \frac{\sin^n(x)}{2^n}$$

3.
$$\sum_{n=1}^{\infty} \frac{x^n}{4^n n^3}$$

4.
$$\sum_{n=1}^{\infty} \frac{n(x+1)^n}{2^n}$$