A **power series** is any series of the form

$$a_0 + a_1 x + a_2 x^2 + \ldots + a_n x^n + \ldots = \sum_{k=0}^{\infty} a_k x^k,$$

or more generally

$$a_0 + a_1(x - x_0) + a_2(x - x_0)^3 + \ldots + a_n(x - x_0)^n + \ldots$$
$$= \sum_{k=0}^{\infty} a_k (x - x_0)^k.$$

A power series will converge over an interval centered at the base-point x_0. This interval is called the **interval of convergence**.

That interval may consist only of the base point, or it may be larger. Some power series converge for all x.

To find the interval of convergence of a power series $\sum_{k=0}^{\infty} a_k(x-x_0)^k$, use the ratio test on

$$\sum_{k=0}^{\infty} |a_k(x-x_0)^k| = \sum_{k=0}^{\infty} |a_k| \cdot |x-x_0|^k.$$

1. Where $L < 1$, the power series will converge absolutely.
2. Where $L > 1$, the power series will diverge.
3. Where $L = 1$ (which will be the two endpoints of your interval of convergence), you need to test further.