# 11.8 Power Series

Real numbers: $x$, $x_0$

Power series: $\sum_{n=0}^{\infty} a_n x^n$, $\sum_{n=0}^{\infty} a_n (x - x_0)^n$

Whole number: $n$

Radius of Convergence: $R$

**1219.** Power Series in $x$

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

**1220.** Power Series in $(x - x_0)$

$$\sum_{n=0}^{\infty} a_n (x - x_0)^n = a_0 + a_1 (x - x_0) + a_2 (x - x_0)^2 + \ldots + a_n (x - x_0)^n + \ldots$$

**1221.** Interval of Convergence

The set of those values of $x$ for which the function

$f(x) = \sum_{n=0}^{\infty} a_n (x - x_0)^n$ is convergent is called the interval of convergence.

**1222.** Radius of Convergence

If the interval of convergence is $(x_0 - R, x_0 + R)$ for some $R \geq 0$, the $R$ is called the radius of convergence. It is given as

$$R = \lim_{n \to \infty} \frac{1}{\sqrt[n]{a_n}} \quad \text{or} \quad R = \lim_{n \to \infty} \left| \frac{a_n}{a_{n+1}} \right|.$$