Series Solution

power Series:

An infinite series of the form $\sum_{n=0}^{\infty} c_n (x-x_0)^n$

$$= c_0 + c_1(x-x_0) + c_2(x-x_0)^2 + \cdots \longrightarrow (1)$$

is called a power series in $(x-x_0)$

The Series converges absolutly for $|x| < R$ where $R = \lim_{n\to\infty}\left|\frac{c_n}{c_{n+1}}\right|$ provided the limit exists, * R is said to be the radius of converges of (1)

Analytic function:

A function $f(x)$ defined on an interval containing the point $x = x_0$ is called analytic at ~~x_0~~ x_0 if its Taylor series $\sum_{n=1}^{\infty} \frac{f^n(x_0)}{\lfloor n}(x-x_0)$ exists and converges to $f(x)$ for all x in the interval of convergence $(-R, R)$.