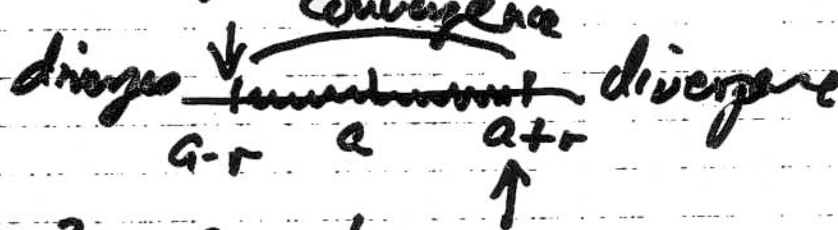
The largest value $r \geq 0$ for which the power series converges for all x satisfying $|x-a|<r$ $-r<x-a<r$ and diverges for all x satisfying $|x-a|>r$ is called the radius of convergence of the power series.

At the end points $x=a+r$ and $x=a-r$, the power series may or may not converge.



Examples:

$$\sum_{0}^{\infty} \frac{(x-2)^n}{3^n} = 1 + \frac{x-2}{3} + \frac{(x-2)^2}{9} + \cdots \qquad a=2 \quad c_n = \frac{1}{3^n}$$

$$a_n = \frac{(x-2)^n}{3^n} \qquad a_{n+1} = \frac{(x-2)^{n+1}}{3^{n+1}}$$

$$\left|\frac{a_{n+1}}{a_n}\right| = \left|\frac{(x-2)^{n+1}\, 3^{\cancel{n}}}{3^{\cancel{n}+1}\, (x-2)^{\cancel{n}}}\right| = \left|\frac{x-2}{3}\right|$$

Ratio Test: $\left|\frac{x-2}{3}\right|<1 \Rightarrow$ convergence.

$r=3$. $\qquad \left|\frac{x-2}{3}\right|>1 \Rightarrow$ divergence

$-3<x-2<3$