Consider $\sum_{n=0}^{\infty} c_n (x-a)^n = f(x)$

- The <u>interval of convergence</u> for $f(x)$ is the set of <u>all</u> x-values for which $f(x)$ converges

- An <u>interval on which $f(x)$ converges</u> is an interval of <u>some</u> x-values for which $f(x)$ converges

- Ex: $\sum_{n=0}^{\infty} x^n$

$I.O.C. = (-1, 1)$

Converges on $\left(-\frac{1}{2}, \frac{1}{3}\right]$

$\left(\frac{1}{2}, \frac{3}{4}\right)$

- Ex: $f(x) = \sum_{n=0}^{\infty} (-1)^n x^n$ $\quad$ $g(x) = \sum_{n=0}^{\infty} (-1)^{n+1} x^n$

$I.O.C. = (-1, 1)$ $\quad$ $I.O.C. = (-1, 1)$

- $f(x) + g(x)$ $\quad$ $\sum_{n=0}^{\infty} \left((-1)^n + (-1)^{n+1} \right) x^n$

Thm: Converges on $(-1, 1)$

$$\sum_{n=0}^{\infty} \left((-1)^n + (-1)^n (-1) \right) x^n$$

$$\sum_{n=0}^{\infty} \left((-1)^n - (-1)^n \right) x^n$$

$$\sum_{n=0}^{\infty} 0 \cdot x^n = 0$$

Converges for $x \in (-\infty, \infty)$