What you'll Learn About
Interval and Radius of Convergece

Geometric / Ratio Test

Find the $\boxed{\text{Radius of Convergence}}$

Center
$x=-5$

$\sum_{n=0} 0^n$

$\sum 0 = 1 + 0 + 0 + 0 + 0$

8) $\sum_{n=0}^{\infty}(x+5)^n = 1 + (x+5)^1 + (x+5)^2 + (x+5)^3 + \cdots$

$r = x+5$

$|r| < 1$

$-1 < r < 1$

$-1 < x+5 < 1$
$-5 \quad -5 \quad -5$
$-6 < x < -4$

$R.O.C = 1$

8) $\sum_{n=0}^{\infty}(x+5)^n =$

$$\lim_{n\to\infty}\left|\frac{(x+5)^{n+1}}{(x+5)^n}\right| = \lim_{n\to\infty}\left|x+5\right| = |x+5| < 1$$

$-1 < x+5 < 1$

$-6 < x < -4$

	12) $\sum_{n=0}^{\infty} \frac{n(x^n)}{n+2} =$ $\lim_{n\to\infty} \left| \frac{(n+1)x^{n+1}}{(n+3)} \cdot \frac{(n+2)}{(n)x^n} \right| = \lim_{n\to\infty} \left| \frac{(n+1)(n+2)x}{n(n+3)} \right| = \|x\| < 1$ $-1 < x < 1$ R.O.C = 1 18) $\sum_{n=0}^{\infty} \frac{\sqrt{n}x^n}{3^n} =$ $\lim_{n\to\infty} \left| \frac{(n+1)^{1/2} x^{n+1}}{3^{n+1}} \cdot \frac{3^n}{n^{1/2} x^n} \right|$ $\lim_{n\to\infty} \left| \frac{(n+1)^{1/2} x^n \cdot x \cdot 3^n}{3^n \cdot 3 \cdot n^{1/2} \cdot x^n} \right|$ $\lim_{n\to\infty} \left| \frac{x(n+1)^{1/2}}{3n^{1/2}} \right| = \left| \frac{x}{3} \right| < 1$ $-1 < \frac{x}{3} < 1$ $-3 < x < 3$ R.O.C = 3

$(2n)!$ next term $(2(n+1))! = (2n+2)!$	A) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{(2n)!} =$ $\lim_{n \to \infty} \left\| \frac{(-1)^{n+1} x^{n+1}}{(2n+2)!} \cdot \frac{(2n)!}{(-1)^n x^n} \right\| = \lim_{n \to \infty} \left\| \frac{x}{(2n+2)(2n+1)} \right\|$ $= 0 < 1$ I.O.C $-\infty < x < \infty$ R.O.C: ∞ 15) $\sum_{n=1}^{\infty} (n+1)!\, x^n =$ $\lim_{n \to \infty} \left\| \frac{(n+2)!\, x^{n+1}}{(n+1)!\, x^n} \right\| = \lim_{n \to \infty} \left\| \frac{(n+2)\, x}{1} \right\| = \infty > 1$ Diverge always except at the center $(x=0)$ R.O.C $= 0$