Friday Week 8

Calculus III

Finding the interval of convergence of a power series.

	$\lim_{n\to\infty} \left\| \frac{a_{n+1}}{a_n} \right\|$	Radius of of convergence	Interval of convergence
Converges only when $x = a$	∞ if $x - a \neq 0$	$R = 0$	$[a, a] = \{a\}$
Converges for all x	0	$R = \infty$	$(-\infty, \infty) = \mathbb{R}$
Converges if $\|x - a\| < R$, diverges if $\|x - a\| > R$	$N \cdot \|x - a\|$	$R = \frac{1}{N}$	Four possibilities: $(a - R, a + R)$ $[a - R, a + R)$ $(a - R, a + R]$ $[a - R, a + R]$

- Use the Ratio Test (or the Root Test) to find the radius of convergence.
- If $R = \frac{1}{N} \neq 0$, test to see if the series converges when $x = a - R$ and when $x = a + R$. Use any appropriate convergence test.
- Does the series converge at either endpoint? If so, then include the endpoint in the interval of convergence.

For each of the following power series, find its center a, its radius of convergence R, and its interval of convergence.

1. $\sum_{n=0}^{\infty} \frac{n!(x+2)^n}{e^{2n}}$

Center:
Radius of convergence:
Interval of convergence:

2. $\displaystyle\sum_{n=0}^{\infty} \frac{(x-2)^n}{5^n\sqrt{n+1}}$

Center:
Radius of convergence:
Interval of convergence:

3. $\sum_{n=0}^{\infty} \frac{(x-1)^n}{n!}$

Center:
Radius of convergence:
Interval of convergence: