Warmup:

1. Discuss the meaning of: power series, power series centered at a, radius of convergence, interval of convergence.

2. Find the value of the following power series at the given x.

   (a) $\displaystyle\sum_{n=0}^{\infty} x^n, x = \frac{1}{2}$ (b) $\displaystyle\sum_{n=0}^{\infty} \frac{(x-2)^n}{3^n}, x = 1$

   What would happen if you tried to evaluate the series at an x not in the interval of convergence?

3. One of these is **not** a possible interval of convergence for a power series centered at a. Which is it? (If R appears, it's the radius of convergence.)

   $(-\infty, \infty)$ $\{a\}$

   $(a - R, a + R]$ $[0, \infty)$

   Are there other possible intervals of convergence not listed above?

Problems:

1. Find the radius and interval of convergence:

   (a) $\displaystyle\sum_{n=0}^{\infty} \frac{(x-2)^n}{n3^n}$ (c) $\displaystyle\sum_{n=0}^{\infty} \frac{n!(x+4)^n}{\sqrt{n}}$

   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{x^n}{n!}$ (d) $\displaystyle\sum_{n=0}^{\infty} \frac{n(x+1)^n}{4^n}$

2. Find a series whose interval of convergence is $[4, 6)$, one whose interval is $(4, 6]$, and one whose interval is $[4, 6]$.

3. Find the radius of convergence:

(a) $$\sum_{n=1}^{\infty} \frac{x^n}{1 \cdot 3 \cdot 5 \cdot 7 \cdot \cdots \cdot (2n-1)}$$ (b) $$\sum_{n=1}^{\infty} \frac{n!x^n}{1 \cdot 3 \cdot 5 \cdot 7 \cdot \cdots \cdot (2n-1)}$$

4. Suppose $\sum_{n=0}^{\infty} c_n 4^n$ converges. Can we assume $\sum_{n=0}^{\infty} c_n(-4)^n$ converges? How about $\sum_{n=0}^{\infty} c_n(-2)^n$?