1. Determine all values of $x$ for which the power series $\sum_{n=0}^{\infty} \frac{x^{3n}}{n!}$ is convergent.

2. Determine all values of $x$ for which the power series $\sum_{n=1}^{\infty} n^n \cdot x^n$ is convergent.

   Hint: If $\lim_{n \to \infty} a_n = \infty$ and $b_n > a_n$ for every positive integer $n$, then $\lim_{n \to \infty} b_n = \infty$.

3. Determine all values of $x$ for which the power series $\sum_{n=0}^{\infty} x^n$ is convergent. For those values of $x$, what does this series converge to?

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You have seen the following possibilities for the set of real numbers $x$ at which a power series centered at 0 converges:

1. $[-2, 2]$.
2. $(-\infty, \infty)$.
3. $\{0\}$ (the set consisting of zero alone).
4. $(-1, 1)$.

In fact, there is always a *radius of convergence* (in the cases above, in order, 2, $\infty$, 0, and 1), and an *interval of convergence* (for which you need to do extra work to see which endpoints it contains).

There is a similar statement for other centers.

4. Determine the radius of convergence of the power series \[ \sum_{n=1}^{\infty} x^n \frac{7^n}{n} \].

5. Determine the interval of convergence of the power series \[ \sum_{n=1}^{\infty} \frac{x^n}{7^n \cdot n} \] (the same series as in the previous problem).