# Questions:

- What are the radius & interval of convergence for

$$-\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2} x^n \qquad -\sum_{n=1}^{\infty} \frac{x^n}{n} \; ?$$

- Find power series with intervals of convergence
  - $(-1,1)$ - $[-1,1]$ - $(-1,1]$ - $[-1,1)$

- Transformations of power series:

Say we have a power series $\sum_{n=0}^{\infty} b_n (x-a)^n$.

If we "change the center" and consider $\sum_{n=0}^{\infty} b_n (x-c)^n$ for some value $c$. What will happen to our interval & radius of convergence? Given some value $x=\alpha$, for which the series $\sum_{n=0}^{\infty} b_n (x-a)^n$ converges, can we find some value $x=\beta$ for which the series

$\sum_{n=0}^{\infty} b_n (x-c)^n$ converges to the same value?

- Consider again $\sum_{n=0}^{\infty} b_n (x-a)^n$ fixing a value $c$, how does the behavior of

$\sum_{n=0}^{\infty} (cb_n)(x-a)^n$ & $\sum_{n=0}^{\infty} (c^n b_n)(x-a)^n$

Compare to $\sum_{n=0}^{\infty} b_n (x-a)^n$. How do the radius & interval of convergence compare? Is there any connection between these series when we plug in (possibly different) $x$ values?

- Suppose we have some power series $\sum_{n=0}^{\infty} b_n (x-a)^n$ & a function $f(x)$ whose domain is the interval of convergence of our series, and on this interval

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

- What is the 100th derivative of $f(x)$ at $a$? That is $f^{(100)}(a)$?
- What is the Taylor series for $f(x)$ centered at $a$?
- Now consider the function $g(x) = f(x-c)$ for some value $c$. Find some power series representation for $g$ (Hint: centered where?).
- Consider $h(x) = c \cdot f(x)$. Find some power series representation for $h$.
- Consider $k(x) = f(cx)$. Find some power series representation for $k$.
- Consider $j(x) = f(x^2)$. Find some power series representation for $j$.

- Consider $\ell(x) = x \cdot f(x)$. Find some power series representation for $\ell$.

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By Monday @ 11:59 pm,

Turn in at least the first two "non-transformation questions" or one "transformation" question.