Integration & differentiation of power series

\[ \sum_{n=0}^{\infty} a_n x^n = f(x) \leq \frac{1}{\epsilon} \sum_{n=0}^{\infty} |a_n| x^n \leq \frac{1}{\epsilon} \sum_{n=0}^{\infty} \frac{a_n}{|a_n|} x^n \]

Radius of convergence for series \( \sum_{n=0}^{\infty} a_n x^n \) coincides with \( R \).

\[ \sum_{n=0}^{\infty} (a_n x^n) = \sum_{n=0}^{\infty} (a_n x^n)^n \] (for changing radius of convence)

\[ \sum_{n=0}^{\infty} \frac{a_n}{|a_n|} x^n = \sum_{n=0}^{\infty} \frac{a_n}{|a_n|} x^n \]

Le Leibniz formula, time of a convergent sequence.

\[ \sum_{n=0}^{\infty} a_n x^n \]

by definition 1, hence multiplex by \( x \), instead of multiplying by \( x \).

\[ f(x) = \sum_{n=0}^{\infty} a_n x^n \]

\[ F(x) = \sum_{n=0}^{\infty} a_n x^n \]

\[ f(x) = \int f(x) \, dx \]

\[ F(x) = \int F(x) \, dx \]

Term by term integration does not change radius of convergence.

**Examples**

- Power series for \( \ln(1+x) \)

\[ \ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots \]

- Power series for \( \tan^{-1}(x) \)

\[ \tan^{-1}(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots \]

Mean for Exam 2:

*topic 66/66 (4)*

Exam:

1. Un. (more info to come later)
2. Cut off for A. ≤ 60/65 for the course.

Instead of homework, review material and write down important facts.