6.1 - Review of Power Series

A power series has the form

$$\sum_{k=0}^{\infty} c_n(x-a)^n = c_0 + c_1(x-a) + c_2(x-a)^2 + \cdots$$

Definition: A function is **analytic at a point a** if it can be represented with a power series centered at a with radius $R \neq 0$.

Example: Rewrite the given expression using a single power series whose general term involves x^k.

$$\sum_{n=1}^{\infty} nc_n x^{n-1} + 3\sum_{n=0}^{\infty} c_n x^{n+2}$$

Find a power series solution $y = \sum_{n=0}^{\infty} c_n x^n$ of the given linear first-order differential equation.

$4y' + y = 0$

Example: The given function is analytic at $a = 0$. Use appropriate series and multiplication to find the first four nonzero terms of the Maclaurin series of the given function.

$e^{-x} \cos x$