# 6.1 - Review of Power Series

## 6.1a

A power series has the form

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

**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 $x^k$.

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

## 6.1b

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

$4y' + y = 0$

## 6.1c

**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.

$e^{-x} \cos x$