

Math 426.2SY

Calculus II

University of New Hampshire

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Outline

1 9.7- Power Series

Introduction

Definition

- A power series about $x = 0$ is a series of the form

$$\sum_{n=0}^{\infty} c_n x^n =$$

- A power series about $x = a$ is a series of the form

$$\sum_{n=0}^{\infty} c_n (x - a)^n =$$

in which the **center** a and the **coefficients** c_0, c_1, c_2, \dots are constants.

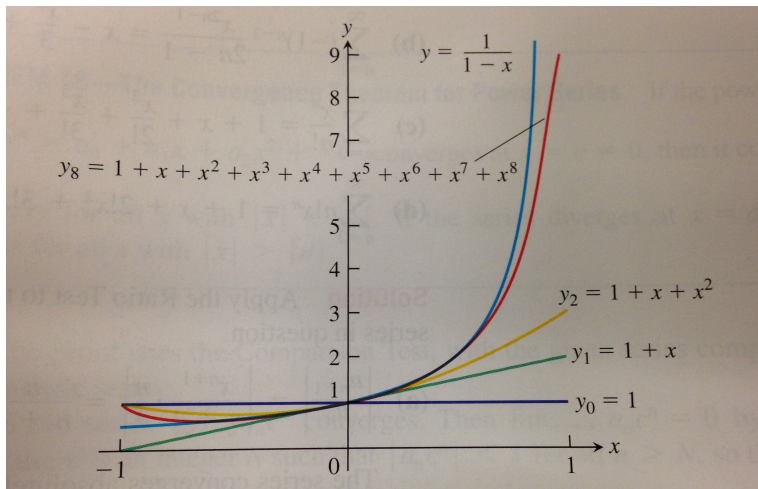
Power Series

Example

Consider the power series $\sum_{n=0}^{\infty} x^n =$

- For what values of x does this series converge? (Interval of convergence).
- What does it converge to?
- What is the radius of convergence?

Power Series



Power Series

Example

$$\sum_{n=0}^{\infty} (-1)^n (2x + 5)^n$$

Power Series

Power Series

Example

$$\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}}$$

Power Series

Power Series

Example

$$\sum_{n=0}^{\infty} \frac{3^n x^n}{n!}$$

Power Series

Operations on Power Series

Example

Find a power series expansion for the function $f(x) = \frac{5}{3-x}$ and find the interval of convergence.

Operations on Power Series

Example

Find a power series expansion for the function $f(x) = \frac{2}{3+x^2}$ and find the interval of convergence.

Derivative of Power Series

Example

Find a power series expansion for the function $f(x) = \frac{1}{(1+x)^2}$

Integral of Power Series

Example

$$f(x) = 2x - 2x^3 + 2x^5 - 2x^7 + \dots$$

Integral Power Series

Integral of Power Series

Example

$$f(x) = 1 - x^2 + x^4 - x^6 + \dots$$