Math 105 Course Outline

Week 12

Overview

We continue our study of power series, focusing on the relation between known functions and their power series representations.

Learning Objectives

These should be considered a minimum, rather than a comprehensive, set of objectives.

By the end of the week, having participated in lectures, worked through the indicated sections of the textbook and other resources, and done the suggested problems, you should be able to independently achieve all of the objectives listed below.

Ref	Learning Objective
13–01	Taylor Series

> **Objective 1**: Given a function f that can be differentiated up to any order, write down the Taylor series for f with center a. Define the Maclaurin series of f. [Recall/Procedural]

Example problem: *Write the Maclaurin series of the function* $\ln(1 + 2x)$ *in summation notation.*

> **Objective 2**: Manipulate Taylor series of known functions to obain Taylor series for other functions. [Procedural/Conceptual]

Example problem: *Use the Maclaurin series of* $(1 + x)^{-1}$ *to deduce the same about* $\arctan x$.

Reading: Text §9.3 (pp. 611 – 614)

Practice problems: Text §9.3, p. 621: *9–28*

Ref	Learning Objective
13–02	Working with Taylor series

> **Objective 1**: Evaluate a power series in terms of a known function. Use this to evaluate certain numerical series. [Procedural]

Example problem: *Identify the function represented by the power series* $\sum_{k=1}^{\infty} \frac{x^{2k}}{k}$. *Hence evaluate the series* $\sum_{k=3}^{\infty} \frac{1}{k4^{2k}}$.

Reading: Text §9.4(pp. 623 – 628)

Practice problems: Text §9.4 p. 629: *21–26*