

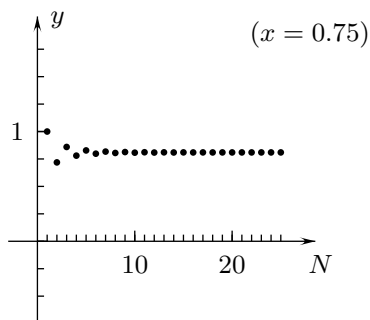
Math 10B. Lecture Examples.

Section 9.5. Power series and intervals of convergence[†]

Example 1 Find the radius of convergence of the power series

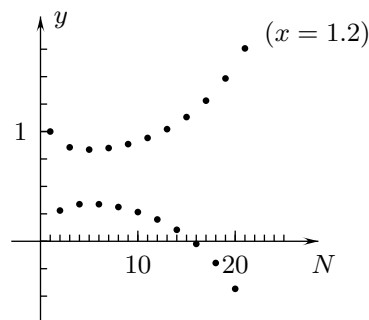
$$\sum_{j=1}^{\infty} \frac{(-1)^{j+1}}{j} x^j = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \dots$$

Answer: [Radius of convergence] = 1 (Figure A1a shows the partial sums for $x = 0.75$, where the series converges, and Figure A1b shows the partial sums for $x = 1.2$, where the series diverges.)



$$y = \sum_{n=1}^N \frac{(-1)^{n+1}}{n} (0.75)^n$$

Figure A1a



$$y = \sum_{n=1}^N \frac{(-1)^{n+1}}{n} (1.2)^n$$

Figure A1B

Example 2 What is the radius of convergence of $\sum_{n=0}^{\infty} \frac{1}{(2n)!} x^n$?

Answer: The radius of convergence R is ∞ .

Example 3 Find the radius of convergence of $\sum_{n=1}^{\infty} \frac{x^n}{n^3 3^n}$.

Answer: The radius of convergence R is 3.

Example 4 What is the radius of convergence of $\sum_{n=0}^{\infty} n! x^{2n}$?

Answer: The radius of convergence R is 0.

Interactive Examples

Work the following Interactive Examples on Shenk's web page, <http://www.math.ucsd.edu/~ashenk/>:[‡]

Section 10.7: Examples 1–4

[†]Lecture notes to accompany Section 9.5 of *Calculus* by Hughes-Hallett et al.

[‡]The chapter and section numbers on Shenk's web site refer to his calculus manuscript and not to the chapters and sections of the textbook for the course.