

Lesson 10.9: Ratio Test

Examples: Determine the convergence or divergence.

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

2. $\sum_{n=1}^{\infty} \frac{3^{n+1}}{4^n n^2}$

3. $\sum_{n=2}^{\infty} \frac{(-1)^n \sqrt{n}}{n-1}$

4. $\sum_{n=1}^{\infty} \frac{(2n+1)!!}{3^n (2n-1)n!} = \sum_{n=1}^{\infty} \frac{(2n+1)(2n-1)(2n-3)\cdots 5 \cdot 3 \cdot 1}{3^n (2n-1)n!}$

Handling Mixed Problems

1.

2.

3.

4.

Mixed Examples:

1. $\sum_{n=1}^{\infty} \frac{n-1}{2n+1}$

2. $\sum_{n=1}^{\infty} n^2 e^{-n^3}$

3. $\sum_{n=1}^{\infty} \left(\frac{e}{3}\right)^n$

4. $\sum_{n=1}^{\infty} \frac{1}{4n+5}$

5. $\sum_{n=1}^{\infty} (-1)^n \frac{3}{n^2}$

6. $\frac{1}{10} + \frac{1 \cdot 2}{10^2} + \frac{1 \cdot 2 \cdot 3}{10^3} + \frac{1 \cdot 2 \cdot 3 \cdot 4}{10^4} + \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5}{10^5} + \dots$