Chapter 11.7 Exercises: Strategy for Testing Series

James Stewart, Calculus, Metric Edition

Difficulty: Medium (14 Problems)

1. **Exercise 9:** Determine whether the series is convergent or divergent.

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

2. **Exercise 10:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{n-1}{n^3+1}$$

3. **Exercise 13:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{e^n}{n^2}$$

4. **Exercise 16:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{(-1)^n n^4}{4^n}$$

5. **Exercise 23:** Determine whether the series is convergent or divergent.

$$\sum_{k=1}^{\infty} \frac{2^{k-1}3^{k+1}}{k^k}$$

6. **Exercise 24:** Determine whether the series is convergent or divergent.

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

7. **Exercise 26:** Determine whether the series is convergent or divergent.

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

8. **Exercise 27:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{\sqrt{n}}$$

9. **Exercise 29:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} (-1)^n \cos(1/n^2)$$

10. **Exercise 30:** Determine whether the series is convergent or divergent.

$$\sum_{k=1}^{\infty} \frac{1}{2+\sin k}$$

11. **Exercise 32:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} n\sin(1/n)$$

12. **Exercise 33:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{4-\cos n}{n^{1.5}}$$

13. **Exercise 37:** Determine whether the series is convergent or divergent.

$$\sum_{k=1}^{\infty} \frac{k\ln k}{(k+1)^3}$$

14. **Exercise 38:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$$

Difficulty: Hard (8 Problems)

15. **Exercise 5:** Test the series (a) and (b) for convergence or divergence.

$$(a)\ \sum_{n=1}^{\infty} \frac{n}{n^2+1} \qquad (b)\ \sum_{n=1}^{\infty} \left(\frac{n}{n^2+1}\right)^n$$

16. **Exercise 6:** Test the series (a) and (b) for convergence or divergence.

$$(a)\ \sum_{n=1}^{\infty} \frac{\ln n}{n} \qquad (b)\ \sum_{n=10}^{\infty} \frac{1}{n\ln n}$$

17. **Exercise 7:** Test the series (a) and (b) for convergence or divergence.

$$(a)\ \sum_{n=1}^{\infty} \frac{1}{n+n!} \qquad (b)\ \sum_{n=1}^{\infty} (\frac{1}{n}+\frac{1}{n!})$$

18. **Exercise 21:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{3^n n^2}{n!}$$

19. **Exercise 25:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{1\cdot 3\cdot 5\cdot \cdots \cdot (2n-1)}{2\cdot 5\cdot 8\cdot \cdots \cdot (3n-2)}$$

20. **Exercise 28:** Determine whether the series is convergent or divergent.

$$\sum_{k=1}^{\infty} \frac{\sqrt[3]{k}-1}{k(\sqrt{k}+1)}$$

21. **Exercise 35:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{n!}{e^{n^2}}$$

22. **Exercise 43:** Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{n^2}$$