

11.3 Exercises

1. Draw a picture to show that

$$\sum_{n=2}^{\infty} \frac{1}{n^{1.3}} < \int_1^{\infty} \frac{1}{x^{1.3}} dx$$

What can you conclude about the series?

2. Suppose f is a continuous positive decreasing function for $x \geq 1$ and $a_n = f(n)$. By drawing a picture, rank the following three quantities in increasing order:

$$\int_1^6 f(x) dx \quad \sum_{i=1}^5 a_i \quad \sum_{i=2}^6 a_i$$

- 3–8 Use the Integral Test to determine whether the series is convergent or divergent.

3. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n}}$

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

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

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

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

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

- 9–26 Determine whether the series is convergent or divergent.

9. $\sum_{n=1}^{\infty} \frac{1}{n\sqrt{2}}$

10. $\sum_{n=3}^{\infty} n^{-0.9999}$

11. $1 + \frac{1}{8} + \frac{1}{27} + \frac{1}{64} + \frac{1}{125} + \dots$

12. $1 + \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \frac{1}{5\sqrt{5}} + \dots$

13. $1 + \frac{1}{3} + \frac{1}{5} + \frac{1}{7} + \frac{1}{9} + \dots$

14. $\frac{1}{5} + \frac{1}{8} + \frac{1}{11} + \frac{1}{14} + \frac{1}{17} + \dots$

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

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

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

18. $\sum_{n=3}^{\infty} \frac{3n-4}{n^2-2n}$

19. $\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$

20. $\sum_{n=1}^{\infty} \frac{1}{n^2+6n+13}$

21. $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

22. $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$

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

24. $\sum_{n=3}^{\infty} \frac{n^2}{e^n}$

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

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