12-4

Practice

Convergent and Divergent Series

Use the ratio test to determine whether each series is convergent or divergent.

1. $\frac{1}{2} + \frac{2^2}{2^2} + \frac{3^2}{2^3} + \frac{4^2}{2^4} + \cdots$

2. $0.006 + 0.06 + 0.6 + \cdots$

3. $\frac{4}{1 \cdot 2 \cdot 3} + \frac{8}{1 \cdot 2 \cdot 3 \cdot 4} + \frac{16}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} + \cdots$

4. $5 + \frac{5}{3^3} + \frac{5}{5^3} + \frac{5}{7^3} + \cdots$

Use the comparison test to determine whether each series is convergent or divergent.

5. $2 + \frac{2}{2^3} + \frac{2}{3^3} + \frac{2}{4^3} + \cdots$

6. $\frac{5}{2} + 1 + \frac{5}{8} + \frac{5}{11} + \cdots$

7. ***Ecology*** A landfill is leaking a toxic chemical. Six months after the leak was detected, the chemical had spread 1250 meters from the landfill. After one year, the chemical had spread 500 meters more, and by the end of 18 months, it had reached an additional 200 meters.

a. If this pattern continues, how far will the chemical spread from the landfill after 3 years?

b. Will the chemical ever reach the grounds of a hospital located 2500 meters away from the landfill? Explain.