Lesson 20-3

Infinite Geometric Series

Practice:

For each Geometric series, find the partial sums for the first 3 terms, first 4 terms, and first 6 terms.

 $S_n = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \cdots \qquad R_n = \frac{1}{32} + \frac{1}{16} + \frac{1}{8} + \frac{1}{4} + \frac{1}{2} + \cdots$

When |r| < 1, the partial sum approaches a fixed number and the series is said to **converge**.

When $|r| \ge 1$, the partial sum does not approach a fixed number and the series is said to <u>diverge</u>.

Example #1: Determine whether each geometric series converges or diverges. A. 10 + 1 + 0.1 + 0.01 + ...

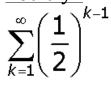
$$\sum_{k=1}^{\infty} 25 \left(\frac{1}{5}\right)^{k-1}$$

If an infinite series converges, we can find the sum.

Sum of an Infinite Geometric Series The sum of an infinite geometric series S with common ratio r and |r| < 1 is $S = \frac{a_1}{1 - r'}$ where a_1 is the first term.

Example #2: Find the sum, if it exists: 1 – 0.2 + 0.04 – 0.008 + ...

You try: Find the sum, if it exists.



$$\sum_{k=1}^{\infty} \frac{3}{4} (7)^{k-1}$$

