

Lesson 10.1: Sequences

Review

Factorial:

Sequence:

Examples:

1. Simplify $\frac{(n+1)!}{n!} =$

2. Write out the first five terms of the sequence $\{a_n\}$ if $a_n = \frac{n}{n+1}$.

3. Write out the first five terms of the recursively defined sequence:
 $a_1 = 5, a_{k+1} = 3a_k + 4$

4. Given the sequence: 2, -6, 18, -54, 162, ...

a. Write a recursive definition for the sequence.

b. Write an explicit equation for the nth term of the sequence.

Convergence or Divergence of a Sequence

If a_n is a sequence and $\lim_{n \rightarrow \infty} a_n = L$, then L is the _____ of the sequence and it

_____ to L .

If the $\lim_{n \rightarrow \infty} a_n$ does not exist, then the sequence $\{a_n\}$ does not have a limit and $\{a_n\}$

_____.

Examples:

1. Find the limit of the sequence $\{b_n\} = \left\{ \frac{1}{1-2n} \right\}$.

2. Determine if these sequences converge or diverge and find the limit if possible.

a. $\{a_n\} = \{3 + (-1)^n\}$

b. $\{a_n\} = \left\{ \frac{\ln(n^2)}{n} \right\}$

A sequence is _____ if it is nonincreasing or nondecreasing.

A sequence is _____ if every term is greater than or equal to some number N (the lower bound) and also every term is less than or equal to some number M (the upper bound).

Examples: Determine whether these sequences are monotonic and bounded.

1. $\{a_n\} = \{3 + (-1)^n\}$

2. $\{b_n\} = \left\{\frac{2n}{1+n}\right\}$

3. $\{a_n\} = \left\{\frac{1}{n}\right\}$

4. $\{c_n\} = \left\{\frac{n^2}{1+n}\right\}$

