Name:

 $a_n = a_{n-1} + 4$

A sequence is a list of things generated by a rule

More formally, a sequence is a function whose domain is the set of positive integers, or natural numbers, n such that $n \in \mathbb{N} = \{1, 2, 3, ...\}$. The range of the function are called the terms in the sequence,

 $a_1, a_2, a_3, \dots a_n$

Where a_n is called the nth term (or rule of the sequence), and we denote the sequence by $\{a_n\}$.

The sequence can be expressed by either

.4n

- 1. An ample number of terms in the sequence, separated by commas
- 2. An ecursive junction including a first term and a rule using the previous term of the sequence.
- 3. A rule for the sequence given as an explicit function set off in curly braces.

Example 1

4,8,12,

Pattern

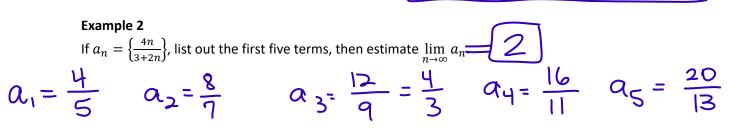
The sequence 2, 4, 6, 8, ... is the sequence of even numbers. Express the same sequence as a rule of a non-negative integer n. The sequence 1, 3, 5, 7, ... is the sequence of odd numbers. Express the same sequence as a rule of a non-negative integer n. How many in the list are needed to establish the "rule" in the absence of the explicitly-stated rule?

$$a_{1}4_{1}6_{1}8_{1}...a_{n}=2n\xi$$

 $l_{1}3_{1}5_{1}7_{1}...a_{n}=2n-1\xi$

Note: When given a sequence as a list, the first term is usually designated to be associated with n = 1. This is because we are using n as a counting number.

We will be primarily interested in what happens to the sequence for increasingly large values of n.



Possibilities for Sequences as $n ightarrow \infty$

Let $\{a_n\}$ be a sequence of real numbers.

- If $\lim_{n \to \infty} a_n = \infty$, then $\{a_n\}$ diverges to infinity.
- If $\lim_{n \to \infty} a_n = -\infty$, then $\{a_n\}$ diverges to negative infinity
- If $\lim_{n \to \infty} a_n = c$, a finite real number, then $\{a_n\}$ converges to c.
- If $\lim_{n \to \infty} a_n$ oscillates between two fixed numbers, then $\{a_n\}$ diverges by oscillation

Factorial

n! Is read as "n factorial." It is defined recursively as n! = n(n-1)! or as

$$n! = n(n-1)! = n \cdot (n-1) \cdot (n-2) \cdot (n-3) \cdot \dots \cdot 3 \cdot 2 \cdot 1$$

For example, $6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$

Example 3 Determine whether the following sequences converge or diverge

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