9.4 Sequences

Obj: 1. Express sequences explicitly & recursively.
2. Find limits of convergent sequences.

Sequence: an ordered progression of #s.

ex $5, 10, 15, 20, 25$

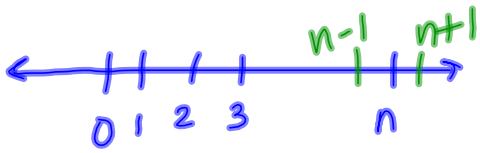
$2, 4, 8, 16, \ldots$

$\left\{\frac{1}{k} : k = 1, 2, 3, \ldots\right\}$

$1, \frac{1}{2}, \frac{1}{3}, \ldots$

$\{a_1, a_2, a_3, \ldots, a_k\} = \{a_k\}$

Apr 15-9:11 AM



$a_n \rightarrow$ Find a_{n+1}

Find the 1st 6 terms & the 100th term of the sequence $\{a_k\}$ in which explicit $a_k = k^2 - 1$

$a_1 = 1^2 - 1 = 0$
$a_2 = 2^2 - 1 = 3$
$a_3 = 3^2 - 1 = 8$
$a_4 = 4^2 - 1 = 15$
$a_5 = 5^2 - 1 = 24$
$a_6 = 6^2 - 1 = 35$
$a_{100} = 100^2 - 1 = 9999$

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Find the 1st 6 terms & 100th term for the sequence defined recursively by the conditions: $b_1 = 3$, $b_n = b_{n-1} + 2$

$b_1 = 3$

$b_2 = 3 + 2 = 5$ (+2)

$b_3 = 5 + 2 = 7$ (+2)

$b_4 = 7 + 2 = 9$

$b_5 = 11$

$b_6 = 13$

$b_{100} = b_{99} + 2$

$= 3 + 2(99) = 201$

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Let $\{a_n\}$ be a seq. of real #s & consider $\lim_{n\to\infty} a_n$. If the limit is a finite # L, the seq. converges. If the limit is infinite or non-existent, the seq. diverges.

Determine whether the seq. converges or diverges. If it converges, find the limit.

a. $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots, \frac{1}{n}, \ldots$ converges, $\lim = 0$

b. $2, 4, 8, 16, 32, \ldots$ diverges

c. $1, -1, 1, -1, 1, -1, \ldots$ diverges

Apr 15-9:52 AM

Arithmetic Sequences: each successive term has a common difference.

$5, 10, 15, 20, 25$ (+5, +5, +5)

$\{a, a+d, a+2d, \ldots\}$

d: common diff

a: 1st term

Recursive

$a_1 =$

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

Explicitly:

$a_n = a_1 + d(n-1)$

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Find: a. common diff b. 10^{th} term c. recursive rule d. explicit rule

$-6, -2, 2, 6, 10, \ldots$ (+4)

a. $a_2 - a_1 = -2 - -6 = 4$

b. $a_{10} = -6 + 4(9) = 30$

c. $a_1 = -6$

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

Apr 15-10:06 AM