8.1 Sequences

Sequence Vocab.

sequence - pattern of #'s

finite - ends

infinite - never ends

explicit - each term is defined independently

rule: $a_n = 4 + 5n$

recursive - use the previous term to define the following terms

rule: $a_1 = 5$ $a_{n+1} = a_n - 4$

$a_2 = 5 - 4 = 1$

$a_3 = 1 - 4 = -3$

$a_4 = -3 - 4 = -7$

$a_5 = -7 - 4 = -11$

Arithmetic Sequence

arithmetic - sequence with common difference between successive terms (repeated addition) linear

explicit rule: $a_n = a_1 + (n-1)d$

3 (+4), 7 (+4), 11 (+4), 15, ...

d = common difference

n = term number

a = term

$a_n = 3 + (n-1)4$

$= 4n - 1$

recursive rule: $a_n = a_{n-1} + d \quad n \geq 2$

$a_1 = \#$

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

Find the common difference, a recursive rule, and an explicit rule for the following sequence:

5, 2, -1, -4, -7, ...

$d = -3$

Exp. $a_n = 5 + (n-1)(-3)$

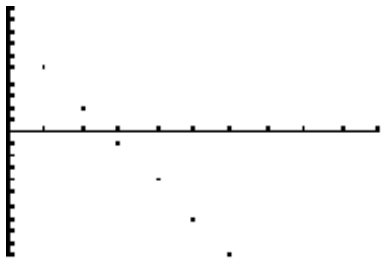
$5 - 3n + 3$

Rec. $a_1 = 5$

$a_{n+1} = a_n - 3$

$n \quad n-1$

Graph it:



The fifth & ninth terms of an arithmetic sequence are 5 and -3, respectively. Find the first term and an explicit rule for the nth term.

$5 = a_1 + (5-1)(d)$

$-3 = a_1 + (9-1)(d)$

$-(5 = a_1 + 4d)$

$-3 = a_1 + 8d$

$-5 = -a_1 - 4d$

$-8 = 4d$

$-2 = d$

$a_1 = 13$

$a_n = 13 + (n-1)(-2)$

$a_n = -2n + 15$

Geometric Sequence

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geometric - sequence with a common ratio (quotient) between successive terms (repeated multiplication) exponential

explicit rule: $a_n = a_1 \bullet r^{(n-1)}$

r = common ratio
n = term number
a = term

recursive rule: $a_n = a_{n-1} \bullet r \quad n \geq 2$