11.5 Recursive Rules for Sequences

std. 22.0

explicit rule gives a_n in terms of n $\quad a_n = a_1 + (n-1)d$ $\quad a_n = a_1 r^{n-1}$

recursive rule gives a_n using previous term or terms

$a_1, a_2, a_3, \ldots, a_{n-2}, a_{n-1}, a_n$

ex. 1 **Give the 1st 5 terms of each sequence:**

a) $a_1 = 1$, $a_n = (a_{n-1})^2 + 1$ $\quad a_2 = (a_1)^2 + 1$

1, 2, 5, 26, 677 $\quad (1)^2+1 \quad 2^2+1 \quad 5^2+1 \quad 26^2+1$

b) $a_0 = 2$, $a_1 = 2$, $a_n = .5(a_{n-2}) + a_{n-1}$ $\quad$ 1st 2nd 3rd

2, 2, 3, 4, 5.5 $\quad .5(2)+2 \quad .5(2)+3 \quad .5(3)+4$ $\quad a_{n-2} \quad a_{n-1}$

ex. 2 **Write a recursive rule for** $\quad a_{n-2}\ a_{n-1}\ a_n$

a) 17, 34, 68, . . . $\quad$ (x2, x2)

$a_1 = 17$, $a_n = 2(a_{n-1})$ $\quad$ prev. term

b) 1, 1, 2, 3, 5, . . . $\quad$ 1st + 2nd = 3rd

$a_1 = 1$, $a_2 = 1$, $a_n = a_{n-2} + a_{n-1}$

ex. 3 **Write an explicit rule and a recursive rule:**

a) $a_1 = 15$, $d = 5$

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

$a_n = 15 + (n-1)5$

$a_n = 5n + 10$

recursive

$a_1 = 15$, $a_n = a_{n-1} + 5$

b) $a_1 = 4$, $r = 0.2$

geo. $a_n = 4(.2)^{n-1}$

recursive

$a_1 = 4$, $a_n = (.2)a_{n-1}$