Sequences

arithmetic – constant difference
d is the slope,
geometric – constant ratio
r is the base of exp.

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arithmetic → $a_n = a_1 + d(n-1)$

$a_n = a_0 + dn$

ex $\boxed{a_n = 2n}$ → $a_1 = 2$

$a_0 = 0$ $\boxed{a_n = 2 + 2(n-1)}$

Describing same exact sequence.

ex $\boxed{a_2 = 5}$ and a_n is arithmetic

$a_5 = 26$

$\frac{26-5}{3 \text{ terms}} = \frac{21}{3} = 7$

$\boxed{d = 7}$

count backwards from a_2 $\boxed{a_1 = -2}$

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

$5 = a_2 = a_1 + 7(2-1)$

$5 = a_1 + 7$

$\boxed{-2 = a_1}$

$a_n = -2 + 7(n-1)$

Geometric Sequences

$y = ab^x$ ← $b_n = b_1 r^{n-1}$ | n is like the input x

$b_n = b_0 r^n$

ex $b_2 = 9$ $\quad b_5 = \frac{1}{3}$

looking for r $\quad r^3 \Leftarrow \frac{b_5}{b_2} = \frac{\frac{1}{3}}{9} = \frac{1}{27}$

$r = \frac{1}{3}$

count back $b_1 = 27$

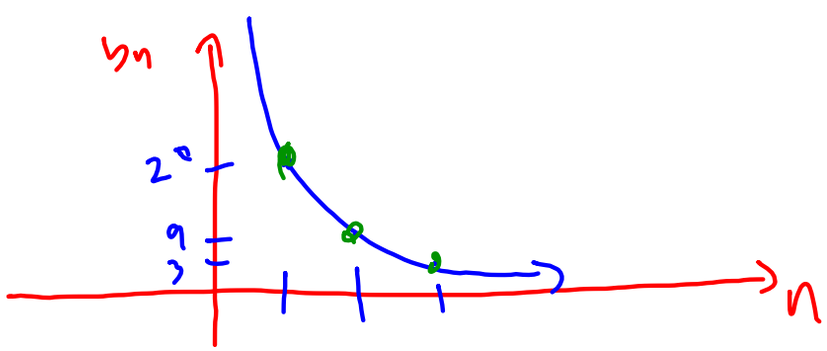
or use $b_n = b_1 r^{n-1}$

$9 = b_2 = b_1 \left(\frac{1}{3}\right)^{2-1}$

$9 = b_1 \left(\frac{1}{3}\right)$

$27 = b_1$

$b_n = 27\left(\frac{1}{3}\right)^{n-1}$



ex

$a_3 = 5.7$

$a_6 = 9$

and a_n is arithmetic.

find a_n and a_{20}

$$d = \frac{a_6 - a_3}{6 - 3} = \frac{3.3}{3} = 1.1$$

$a_2 = 4.6$

$a_1 = 3.5$

$$\boxed{a_n = 3.5 + 1.1(n-1)}$$

$$a_{20} = 3.5 + (1.1)(19)$$

$$= 3.5 + 20.9 = 24.4$$

ex.

$a_2 = 6$

$a_4 = 54$

a_n is geometric

find a_n and a_{20}

ratio

$$r^2 = \frac{54}{6} = 9$$

$$r = 3$$

$a_1 = 2$

$$a_n = a_1 r^{n-1}$$

$$a_n = 2(3)^{n-1}$$

$$a_{20} = 2(3)^{19}$$