

Exponential Formula

geometric sequences

ex u_0 u_1 u_2
3, 6, 12...

recursive formula

$$u_0 = 3$$

$$u_n = u_{n-1} \cdot \underline{2}$$

$$n \geq 1$$

explicit formula

$$u_n = 3(2)^n$$

continuous formula

$$y = 3(2)^x$$

in general...

recursive formula

$$u_0 = \underline{\quad}$$

$$u_n = u_{n-1} \cdot CR$$

$$n \geq 1$$

explicit formula

$$u_n = u_0 (CR)^n$$

continuous formula

$$y = a(b)^x$$

$$y \rightarrow u_n$$

$$x \rightarrow n$$

$$a \rightarrow u_0$$

$$b \rightarrow CR$$

exponential formula $[y = a(b)^x]$

→ a is the principle amount aka the y-int.

→ b is the common ratio aka the rate aka the base

$b > 1$ growth

$0 < b < 1$ decay

more growth & decay rates

given the b (CR) & asked for G/D %

$$G\% = (b - 1) \cdot 100$$

$$D\% = (1 - b) \cdot 100$$

ex $y = 3(1/2)^x$

$$D\% = (1 - 1/2) \cdot 100 = 50\%$$

given G/D % & asked for b

1st make % a decimal (/100)

→

$$b = 1 + GR$$

$$b = 1 - DR$$

ex 120% Growth

$$\hookrightarrow 1.2 \rightarrow b = 1 + 1.2 = 2.2$$

examples

1. 27, 9, 3...
find the exp. formula & G/D %.
2. $y = 7(4)^x$
what's ~~#~~ the y-int?
what's b?
what's the G/D %?
3. Starting # is 3 & there's 80% growth.
Find b.
What's the exp. formula?
4. Starting # is $\frac{2}{3}$ & there's 60% decay.
Find b.
What's the exp. formula?

answers

1. $y = 27\left(\frac{1}{3}\right)^x$
decay % = $1 - \frac{1}{3} = \frac{2}{3} \cdot 100 = 66.7\%$
2. y-int: 7, b: 4
Growth % = $4 - 1 = 3 \cdot 100 = 300\%$
3. $b = 1 + 0.8 = 1.8$
 $y = 3(1.8)^x$
4. $b = 1 - 0.6 = 0.4$
 $y = \frac{2}{3}(0.4)^x$