Recursive Formula for Arithmetic Sequence

Arithmetic Sequences represent linear functions.

Recursive formulas can tell us the next term if we know the previous. It shows us the pattern.

$$f(n) = f(n-1) + d$$

$f(n)$ → Next → Term you want

$f(n-1)$ → Now → previous term

d → Constant difference

Explicit Formula

$$y = mx + b$$

m → common difference (slope)

b → y-intercept $f(0)$

Example:

1) $\overset{+2}{}\ \overset{+2}{}\ \overset{+2}{}$

$0 \xrightarrow{-2} 2, 4, 6, 8$

$f(1)$ $f(2)$ $f(3)$ $f(4)$

$y = 2x + 0$

Examples

1) $8, 5, 2, -1$

-3 -3 -3

$f(n) = f(n-1) - 3$ first term $f(1) = 8$

2) $8, 24, 40, 56, \ldots$

$f(n) = f(n-1) + 16$ $f(1) = 8$

Recursive Formula for Geometric Sequence

Geometric sequences represent exponential functions.

$$f(n) = f(n-1) * r$$

- $f(n)$ → Next Term
  - ↳ Term you want
- $f(n-1)$ → Now
  - ↳ previous term
- r → common ratio

Example

1) 5, 25, 125, 625, ...

$\times 5$ $\times 5$ $\times 5$

$f(n) = f(n-1) * 5$ $f(1) = 5$

2) 60, 30, 15, ...

$\div 2$ $\div 2$

$\times \frac{1}{2}$ $\times \frac{1}{2}$

$f(n) = f(n-1) \cdot \frac{1}{2}$ $f(1) = 60$

Explicit Formula

$$y = a * b^x$$

- a → ~~first term~~ ($f(0)$) y-intercept
- b → common ratio

Example:

$f(1)$

1) 2, 4, 8, 16

1 $\div 2$ $\times 2$ $\times 2$ $\times 2$

$$y = 1 * 2^x$$