Sequence - A ordered list of numbers

Finite - stops

Infinite - continues

Explicit Form	Recursive Form
Expressed as a function	Defined by giving one or more of the first few terms and defines the terms that follow using those previous terms.

Explicit Form

Input: n — Output: a_n

$\boxed{Ex}$ $a_n = 2n(-1)^n$

Recursive Form

$\boxed{Ex}$ $a_n = a_{n-1} + 2n - 1$

where $a_1 = 2$

Recall a_{n-1} = Previous Term

a_n = Term

a_{n+1} = Next Term

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$\boxed{\text{Recall}}$ $a! = a(a-1)(a-2)(a-3)\ldots(3)(2)(1)$

Ex $5! = 5\cdot4\cdot3\cdot2\cdot1$

$2! = 2(1)$

$\boxed{\text{Recall}}$ $(-1)^n =$ positive if $2n$ (Even)

$(-1)^n =$ odd if $2n-1$ (Odd)

Ex $(-1)^5 = -1$

$(-1)^{12} = 1$

Converge vs Diverge

A sequence **converges** if the terms approach a specific number

A sequence **diverges** if the terms approach ∞ or $-\infty$

Ex) 1, 2, 3, 4, ,,,, approaches ∞
so $\boxed{\text{Diverges}}$

Ex) 1, .1, .01, .001, ,,,, approaches 0
so $\boxed{\text{converges}}$

Recall: Infinite Limit rules

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = 0$$ if degree of $g(x) > f(x)$

$$\lim_{x \to \infty} \frac{f(x)}{g(x)}$$ Does not exist or $\pm\infty$ if degree of $g(x) < f(x)$

Infinite Limit

$$\lim_{x\to\infty} \frac{f(x)}{g(x)} = a/b$$

if degree of $f(x) = g(x)$

a and b represent the leading coefficient of f and g

* You may typically determine if a series converges or diverges by taking $\lim_{n\to\infty} a_n$

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Ex: $a_n = \dfrac{n^2+4}{3+n}$

$$\lim_{n\to\infty} \frac{n^2+4}{3+n} = \frac{\infty}{\infty} = \infty$$ Diverges

L'Rule $\dfrac{2n}{1} = 2n = \infty$