

Sequences

sequence, list, progression, string

initial term

terms, values, entries, elements, members

length 8

7, 9, 11, 13, 15, 17, 19, 21
 a_1 a_2 a_3 $a_8 = 21$

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ..., 625 = 25^2
 $x(1)$ $x(2)$ $x(3)$ $x(5) = 5^2$ length 25

2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, ..., 1073741824 = 2^{30}
 length 30

} finite / terminating

$1, \sqrt{2}, \sqrt{3}, 2, \sqrt{5}, \sqrt{6}, \sqrt{7}, 2\sqrt{2}, 3, \sqrt{15}, \dots$

13, 92, 41, 56, 80, 53, 60, 91, 38, 59, ...

} infinite / non-terminating

3, 1, 4, 1, 5, 9, 2, 6, 5, 3, ... $\neq$ 1, 3, 4, 1, 5, 9, 2, 6, 5, 3

$-\frac{2}{11}, \frac{3}{13}, -\frac{4}{15}, \frac{5}{17}, -\frac{6}{19}, \frac{7}{21}, -\frac{8}{23}, \frac{9}{25}, -\frac{10}{27}, \frac{11}{29}, \dots$

-1, 1, -9, 2, -25, 3, -49, 4, -81, 5, ...

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ...

a_k $k = \text{index place / rank}$
 $x(n)$ $n = \text{index}$

0th term
 $y_0, y_1, y_2, y_3, \dots$

Sequences

sequence, list, progression, string

initial term

terms, values,
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7, 9, 11, 13, 15, 17, 19, 21

length 8

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ..., 625 = 25²

length 25

2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, ..., 1073741824 = 2²⁰

length 20

1, $\sqrt{2}$, $\sqrt{3}$, 2, $\sqrt{5}$, $\sqrt{6}$, $\sqrt{7}$, $2\sqrt{2}$, 3, $\sqrt{25}$, ...

13, 92, 41, 56, 80, 53, 60, 91, 38, 59, ...

3, 1, 4, 1, 5, 9, 2, 6, 5, 3, ...

$-\frac{2}{11}$, $\frac{3}{13}$, $-\frac{4}{15}$, $\frac{5}{17}$, $-\frac{6}{19}$, $\frac{7}{21}$, $-\frac{8}{23}$, $\frac{9}{25}$, $-\frac{10}{27}$, $\frac{11}{29}$, ...

-1, 1, -9, 2, -25, 3, -49, 4, -81, 5, ...

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ...

finite / terminating

infinite / non-terminating

Sequences

$a_1 = 1^{\text{st}} \text{ term}$
 $a_2 = 2^{\text{nd}} \text{ term}$
 $a_3 = 3^{\text{rd}} \text{ term}$

$a_k = k^{\text{th}} \text{ term}$

k index / place / rank

$x(1) = 1^{\text{st}} \text{ term}$

$x(2) = 2^{\text{nd}} \text{ term}$

$x(n) = n^{\text{th}} \text{ term}$
 n index

7, 9, 11, 13, 15, 17, 19, 21
 a_1 a_2 a_3 a_8

$a_8 = 3 \times a_1$

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ..., 625
 $x(1)$ $x(2)$ $x(3)$ $x(n) > x(n-1)$

2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, ..., 1073 741 824

1, $\sqrt{2}$, $\sqrt{3}$, 2, $\sqrt{5}$, $\sqrt{6}$, $\sqrt{7}$, $2\sqrt{2}$, 3, $\sqrt{25}$, ... = $(\sqrt{n})_{n \geq 1}$

13, 92, 41, 56, 80, 53, 60, 91, 38, 59, ...

3, 1, 4, 1, 5, 9, 2, 6, 5, 3, ... $\neq$ $1, 3, 4, 1, 5, 9, 2, 6, 5, 3, \dots$

$-\frac{2}{11}, \frac{3}{13}, -\frac{4}{15}, \frac{5}{17}, -\frac{6}{19}, \frac{7}{21}, -\frac{8}{23}, \frac{9}{25}, -\frac{10}{27}, \frac{11}{29}, \dots$

$(-1, 1, -9, 2, -25, 3, -49, 4, -81, 5, \dots)$

$\{1, 1, 2, 3, 5, 8, 13, 21, 34, 55, \dots\}$

a_n $n^{\text{th}} \text{ term of sequence}$

$(a_n)_{n=1}^8$ whole sequence

$\{a_n\}_{n=1, \dots, 8}$

$(y_k)_{k=1}^\infty$ (y_k)

$(z_i)_{i=0}^\infty = z_0, z_1, z_2, \dots$

Sequences

$$7, 9, 11, 13, 15, 17, 19, 21$$

$a_1, a_2, a_3, \dots, a_8$

$$a_n = 2n + 5$$

$$a_1 = 2 \times 1 + 5 = 7 \checkmark$$

$$a_2 = 2 \times 2 + 5 = 9 \checkmark$$

$$a_3 = 2 \times 3 + 5 = 11 \checkmark$$

$$a_8 = 2 \times 8 + 5 = 21 \checkmark$$

$$= 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, \dots, 625$$

$x(1), x(2), x(3), \dots, x(5) = 5^2$

$$2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, \dots, 1073741824$$

$$x(k) = k^2$$

$$1, \sqrt{2}, \sqrt{3}, 2, \sqrt{5}, \sqrt{6}, \sqrt{7}, 2\sqrt{2}, 3, \sqrt{15}, \dots$$

$$(-1)^n = \begin{cases} 1 & \text{if } n \text{ even} \\ -1 & \text{if } n \text{ odd} \end{cases}$$

$$13, 92, 41, 56, 80, 53, 60, 91, 38, 59, \dots$$

$$3, 1, 4, 1, 5, 9, 2, 6, 5, 3, \dots$$

$$y_n = \frac{(-1)^n (n+1)}{2n+9}$$

n	1	2	3	4	5	6	7	8	9	10
y_n	$-\frac{2}{11}$	$\frac{3}{13}$	$-\frac{4}{15}$	$\frac{5}{17}$	$-\frac{6}{19}$	$\frac{7}{21}$	$-\frac{8}{23}$	$\frac{9}{25}$	$-\frac{10}{27}$	$\frac{11}{29}$
$2n$	2	4	6	8	10					

$$(z_k) \quad -1, 1, -9, 2, -25, 3, -49, 4, -81, 5, \dots$$

z_1, z_2, z_3

$$z_k = \begin{cases} -k^2 & \text{if } k \text{ is odd} \\ k/2 & \text{if } k \text{ is even} \end{cases}$$

$$1, 1, 2, 3, 5, 8, 13, 21, 34, 55, \dots$$

$$z_{2n} = n, \quad z_{2n-1} = -(2n-1)^2$$

Sequences

$$a_n = 2n + 5$$

$$7, 9, 11, 13, 15, 17, 19, 21$$

a_1, a_2, a_3

$$1, 4, 9, 16, 25, 36, 49, 64, 81, 100, \dots, 625$$

t_1, t_2, t_3 $t_n = n^2$

$$2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, \dots, 1073741824$$

$$1, \sqrt{2}, \sqrt{3}, 2, \sqrt{5}, \sqrt{6}, \sqrt{7}, 2\sqrt{2}, 3, \sqrt{15}, \dots$$

$$13, 92, 41, 56, 80, 53, 60, 91, 38, 59, \dots$$

$$3, 1, 4, 1, 5, 9, 2, 6, 5, 3, \dots$$

$$-\frac{2}{11}, \frac{3}{13}, -\frac{4}{15}, \frac{5}{17}, -\frac{6}{19}, \frac{7}{21}, -\frac{8}{23}, \frac{9}{25}, -\frac{10}{27}, \frac{11}{29}, \dots$$

$$-1, 1, -9, 2, -25, 3, -49, 4, -81, 5, \dots$$

$$1, 1, 2, 3, 5, 8, 13, 21, 34, 55, \dots$$

$f(1), f(2), f(3)$

Recurrence | Iterative formula

$$\begin{cases} a_1 = 7 \\ a_{n+1} = a_n + 2, n \geq 1 \end{cases}$$

$$a_1 = 7$$

$$a_2 = a_1 + 2 = 7 + 2 = 9$$

$$a_3 = a_2 + 2 = 9 + 2 = 11$$

$\vdots$

$$\begin{cases} f(n+1) = f(n) + f(n-1) \\ f(1) = 1 \\ f(2) = 1 \end{cases} \quad n \geq 2$$

$$\begin{cases} t_1 = 1 \\ t_n = t_{n-1} + 2n - 1, n \geq 2 \end{cases}$$

$$t_1 = 1, t_2 = t_1 + 3 = 1 + 3 = 4,$$

$$t_3 = t_2 + 5 = 4 + 5 = 9, \dots$$

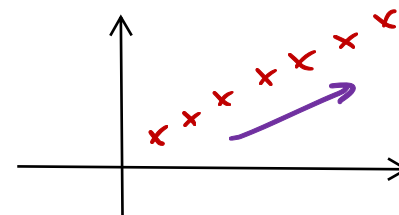
Sequences

$$\lim_{n \rightarrow \infty} a_n = \infty$$

$$(a_n) \rightarrow \infty$$

$+2$ $+2$ $+2$
 $7, 9, 11, 13, 15, 17, 19, 21$

arithmetic progressions



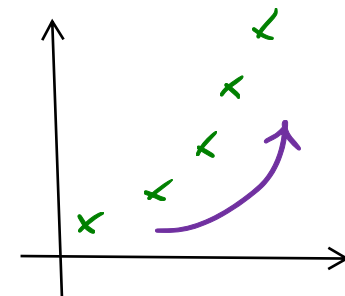
linear

increasing

$1, 4, 9, 16, 25, 36, 49, 64, 81, 100, \dots, 625$

$\times 2$ $\times 2$ $\times 2$
 $2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, \dots, 1073741824$

geometric progressions



$1, \sqrt{2}, \sqrt{3}, 2, \sqrt{5}, \sqrt{6}, \sqrt{7}, 2\sqrt{2}, 3, \sqrt{25}, \dots$

$13, 92, 41, 56, 80, 53, 60, 91, 38, 59, \dots$

$3, 1, 4, 1, 5, 9, 2, 6, 5, 3, \dots$

$-\frac{2}{11}, \frac{3}{13}, -\frac{4}{15}, \frac{5}{17}, -\frac{6}{19}, \frac{7}{21}, -\frac{8}{23}, \frac{9}{25}, -\frac{10}{27}, \frac{11}{29}, \dots$

$-1, 1, -9, 2, -25, 3, -49, 4, -81, 5, \dots$

$1, 1, 2, 3, 5, 8, 13, 21, 34, 55, \dots$

