Sequences and Series

Sequence:

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

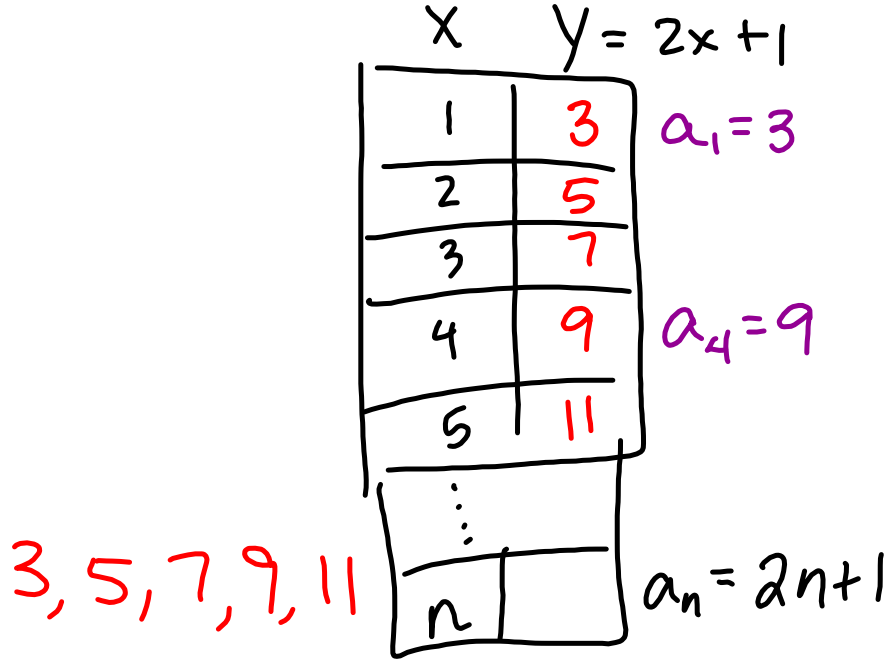
$a_1 = 1$

term

$a_2 = 2$

$a_3 = 3$

$a_8 = 34$


x
y = 2x + 1
1
3
$a_1 = 3$
2
5
3
7
4
9
$a_4 = 9$
5
11
n
$a_n = 2n + 1$
3, 5, 7, 9, 11

Write the first four terms of the sequence given by:

$$a_n = n^2 + 1$$

$a_1 = 2$

$a_2 = 5$

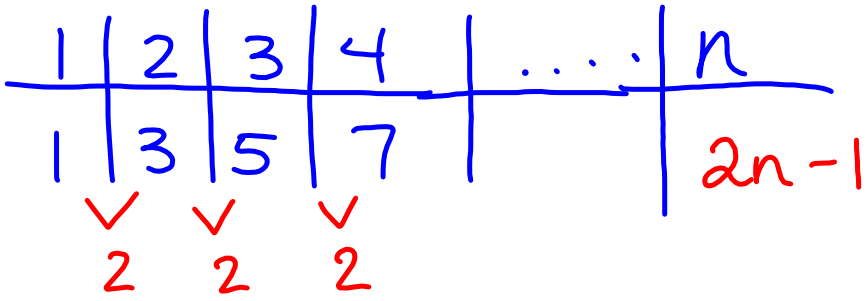
$a_3 = 10$

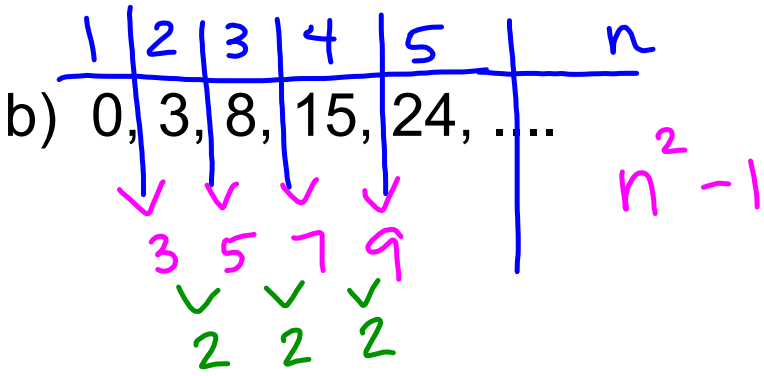
$a_4 = 17$

Finding a pattern

Write an expression for the apparent nth term of each sequence:

a) 1, 3, 5, 7, ...





Recursive sequence: (know previous terms)

$a_k = a_{k-2} + a_{k-1}$

$a_{58} = a_{56} + a_{57}$ 58th

1, 2, 3, 5, 8, 13, 21 ... 56th + 57th

Explicit sequences (term # & formula)

58th

1, 3, 5, 7, ... $2n-1$

$2(58)-1$

Factorial

$5! = 120$

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

$21 \quad 20 \quad 19 \_ \ldots \ldots$.

Simplify:

$$\frac{10!}{8!}$$

$$\frac{10 \cdot 9 \cdot 8 \cancel{\cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}{\cancel{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}}$$

90

Write the first 5 terms:

$$a_n = \frac{n^2}{(n+1)!}$$

Summation

$$\sum$$

1, 3, 5, 7, 9 . . . Sequence

1+3+5+7+9 Series

Find the sum:

$$\sum_{k=3}^{8} (3k - 2) = 87$$

3	4	5	6	7	8
7	+10	+13	+16	+19	+22 =

Series:

Finite $\sum_{k=3}^{8} (3k - 2) = 87$ divergent

infinite $\sum_{x=1}^{\infty} \frac{3}{10^x} = \frac{1}{3}$ convergent

$\frac{3}{10} + \frac{3}{100} + \frac{3}{1000}$

$.3 + .03 + .003$

$.3333\ldots$