Sequences & Series Introduction

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The petals of a flower are as follows:

1, 1, 2, 3, 5, 8, 13, …, 21, 34, 55, 89

Can you find the next four values?

Fibonnaci Sequence

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Sequence

- An ordered list of numbers called Terms
- Infinite Sequence – continues without end.
- Finite Sequence – has a last term
- Terms represented by t :

$$t_1, t_2, t_3, \ldots, t_{n-1}, t_n$$

" the term before "

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① Explicit Formula

- Formula that defines the nth term.
- How we find any term in the sequence.

② Recursive formula

- "the pattern" of the sequence
- Based on what you did with the previous term.

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Write the first four terms of the sequence defined by the explicit formula :

$$t_n = -4n + 5$$

$t_1 = -4(1)+5 = 1$

n	t_1	t_2	t_3	t_4		
t	1	-3	-7	-11		

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Write the first four terms of the sequence defined by the explicit formula :

$$t_n = 2^n - 1$$

n	t_1	t_2	t_3	t_4		
t	1	3	7	15		

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Write the first four terms of the sequence defined by the explicit formula :

$$t_n = 2 + (-1)^n$$

n	t_1	t_2	t_3	t_4		
t	1	3	1	3		

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Recursive Formula

- **One or more previous terms are used to generate the next term.**

- **Find the next three terms:**
- **4, 7, 10, 13, 16, , 19, 22, 25** $t_n = t_{n-1} + 3$
  +3 +3 +3 +3 +3
- **2, -6, 18, -54,** $t_n = -3t_{n-1}$
  ·-3 ·-3 ·-3 ·-3
- **1, 4, 9, 16,** $t_n = n^2$
  1 2 3 4

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Write the first four terms of the sequence defined by the recursive formula :

$$t_n = 2t_{n-1} + 8$$

$$t_1 = 5$$

n	t_1	t_2	t_3	t_4		
t	5	18	44	96		

$t_2 = 2t_{2-1} + 8 = 2t_1 + 8 = 2(5) + 8 = 18$

$t_3 = 2(18) + 8 = 44$

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Write the first four terms of the sequence defined by the recursive formula :

$$t_n = -3t_{n-1} + 2$$

$$t_1 = 2$$

$t_2 = -3t_1 + 2$

$= -3(2) + 2$

~~$-3(2)_{2-1}+2$~~

n	t_1	t_2	t_3	t_4		
t	2	-4	14	-40		

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Back to the petals of a flower:

n = 1 2 3 4 5 6 7

1, 1, 2, 3, 5, 8, 13, …

Can you write a recursive formula for this?

$t_n = t_{n-1} + t_{n-2}$

$t_7 = t_6 + t_5$

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Write a recursive formula for the sequence shown below and find the next three terms.

t_n t_{n-1}

2, 8, 14, 20, 26, … t_n t_{n-1}

$t_n = t_{n-1} + 6$

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Write a recursive formula for the sequence shown below and find the next three terms.

7, 11, 15, 19, …

$t_n = t_{n-1} + 4$

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Write a recursive formula for the sequence shown below and find the next three terms.

2, 7, 22, 67,…

$t_n = 3t_{n-1} + 1$

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Write a recursive formula for the sequence shown below and find the next three terms.

5, 9, 17, 33….

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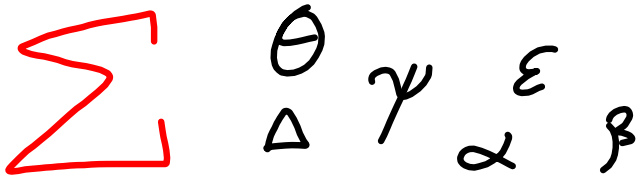
Series



- Expression that indicates the sum of the terms of a sequence.
- We use summation notation: Greek letter sigma

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$\sum_{1}^{5} 2n$ "the sum of *2n* for values of *n* from 1 to 5"

$2n$

$n=1 \quad 2 \quad 3 \quad 4 \quad n=5$

$2(1) \quad 2(2) \quad 2(3) \quad 2(4) \quad 2(5)$

$2 + 4 + 6 + 8 + 10 = 30$

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Write the terms of each series. Then evaluate.

$\sum_{n=1}^{4} 3n+1$

$3n+1$

$n= 1 \quad 2 \quad 3 \quad 4$

$3(1)+1 \quad 3(2)+1 \quad 3(3)+1 \quad 3(4)+1$

$4 + 7 + 10 + 13 = 34$

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Write the terms of each series. Then evaluate.

$$\sum_{n=1}^{3} n^2 + 2n - 1 = 2 + 7 + 14 = 23$$

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Homework

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