10.1 Sequence & Series Intro

Essential Question:

How do I find any term of a sequence or the sum of a series?

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ex 1. 1, 3, 5, 7, 9, 11, 13

n: 1 2 3 4 5

+2 +2 +2 +2

nth term → formula

$a_n = 2n - 1$

a_n: nth term; n: term #

ex 2. Find the ~~first 4 terms~~ and the 100th term.

a. $a_n = \frac{1}{2^n}$

$a_1 = \frac{1}{2^1} = \frac{1}{2}$ $a_2 = \frac{1}{2^2} = \frac{1}{4}$ $a_3 = \frac{1}{2^3} = \frac{1}{8}$ $a_4 = \frac{1}{2^4} = \frac{1}{16}$ $a_{100} = \frac{1}{2^{100}}$

b. $a_n = (-1)^n$ $a_1 = (-1)^1 = -1$ $a_2 = (-1)^2 = 1$ $a_3 = (-1)^3 = -1$ $a_4 = (-1)^4 = 1$

☆Alternating

c. $a_n = (-1)^{n+1}$ $a_1 = (-1)^{1+1}$ $(-1)^2 = 1$ 1, −1, 1, −1, …

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recursive sequence

defined by the previous term

ex 3. $a_n = a_{n-1} + 3 \quad a_1 = 1$ ← first term

↑ previous term

$a_2 = a_{2-1} + 3 = a_1 + 3 = 1 + 3 = 4$

$a_3 = a_{3-1} + 3 = a_2 + 3 = 4 + 3 = 7$

$a_4 = a_3 + 3 = 7 + 3 = 10$

Fibonacci

1, 1, 2, 3, 5, 8...

$a_1 = 1 \quad a_2 = 1$

$a_n = a_{n-2} + a_{n-1}$

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Partial Sum of Sequence

S_n = sum of first n terms

ex 4. Find S_1, S_2, & S_3 for $a_n = 2n+3$

$S_1 = a_1 = 2(1)+3 = 5$

$S_2 = a_1 + a_2 = 5+7 = 12$

$S_3 = a_1 + a_2 + a_3 = 5+7+9 = 21$

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Series & Summation Notation

Adding up sequence

$$\sum_{i=1}^{n} a_i$$

n ← ending term

a_i ↑ sequence formula

$i=1$ starting term

ex 5. $\sum_{x=4}^{10} 2x =$

$2(4)+2(5)+2(6)+2(7)+2(8)+2(9)+2(10)$

ex 6. $\sum_{i=3}^{5} i^2 + 2$

$=((3)^2+2)+((4)^2+2)+((5)^2+2)$

$11+18+27=56$

ex 7. Write in sigma notation $3^3+3^4+3^5+\ldots+3^{20}$

1. Find sequence formula
2. Find starting #
3. Find ending #

$\sum_{n=3}^{20} 3^n$ OR $\sum_{n=1}^{18} 3^{n+2}$