

1.4 Notes Day 2

Series: the sum of the terms in a sequence

2, 5, 8, 11, ...

sequence

2+5+8+11

series

Finite/Partial Arithmetic Series Formula

$$S_n = \frac{n}{2} (a_1 + a_n)$$

n : # of terms

a_1 : first term

a_n : last term

Ex 1 Find S_{20} ← find sum of first 20 terms

1 + 3 + 5 + 7 + ...

$$S_{20} = \frac{20}{2} (1 + 39)$$

$$S_{20} = 400$$

$$a_1 = 1 + 2(20-1) = 39$$

Ex 2 Find the sum of 5, 11, 17, ..., 41

$$S = \frac{7}{2} (5 + 41)$$

$$S_7 = 161$$

$$a_n = 5 + 6(n-1) \quad n \geq 1$$

$$41 = 5 + 6(n-1)$$

$$36 = 6(n-1)$$

$$6 = n-1$$

$$7 = n$$

to find # of terms

Sigma Notation

Diagram illustrating the components of Sigma Notation:

$$\sum_{n=1}^k \text{explicit formula}$$

Annotations:

- k : last term number
- $n=1$: starting term number
- explicit formula

①

$$\sum_{n=1}^{20} 2n-5$$

"Find the sum of the 1st through 20th terms for the sequence $2n-5$ "

$$S_{20} = \frac{20}{2} (\overset{2(1)-5}{\downarrow} (-3) + \overset{2(20)-5}{\swarrow} 35)$$

$$S_{20} = 320$$

②

$$\sum_{n=6}^{15} 3n+2$$

$$S = \frac{10}{2} (\overset{15-5}{\downarrow} 10 + \overset{3(6)+2}{\swarrow} 20 + \overset{3(15)+2}{\swarrow} 47)$$

$$S = 335$$

③ Write an sigma notation

$$2 + 9 + 16 + \dots + 79$$

$$\sum_{n=1}^{12} 2 + 7(n-1)$$

$79 = 2 + 7(n-1)$
 $77 = 7(n-1)$
 $11 = n-1$
 $12 = n$

④ A pyramid of cans is on display at the supermarket. The top row has one can, 2nd row 2 cans, third row 3 cans and so on.

How many cans were used if there are 10 rows in the pyramid?

$$S_{10} = \frac{10(1+10)}{2} = 55 \text{ cans}$$