

## 6.5 Arithmetic Series

Def] the sum of the terms of an arithmetic sequence is an arithmetic series.

$S_n$  is used to denote an arith. series

$$S_n = u_1 + u_2 + u_3 + \dots + u_n + \dots$$

$$S_n = u_1 + (u_1 + d) + (u_1 + 2d) + \dots$$

General Formula for finding the  $n^{\text{th}}$  term

$$S_n = \frac{n}{2}(u_1 + u_n)$$

$$S_n = \frac{n}{2} \left( 2u_1 + (n-1)d \right)$$

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for derivation

Ex 11 Calculate the 1st 15 terms of  
the series  $29 + 21 + 13 + \dots$

$$\begin{aligned} S_{15} &= \frac{15}{2} (2(29) + (14)(-8)) & u_1 &= 29 \\ & & d &= -8 \\ &= 7.5(58 - 112) \\ &= -405 \end{aligned}$$

$$S_n = \frac{n}{2}(u_1 + u_n)$$

Ex 2

a. Find the number of terms in the finite series  $14 + 15.5 + 17 + \dots + 50$   
 $u_1 \quad u_2 \quad u_n$

$$u_1 = 14$$
$$u_n = 50$$
$$d = +1.5$$

$$u_n = 14 + (n-1)1.5$$

50

Sequence

$$14, 15.5, 17, \dots, 50$$

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

$$u_n = u_1 + d(n-1)$$

$$50 = 14 + 1.5(n-1) \quad 50 = 14 + 1.5n - 1.5$$

$$50 = 12.5 + 1.5n$$

$$37.5 = 1.5n$$

$$n = 25$$

b) Find the sum of the terms

$$S_{25} = \frac{25}{2}(14 + 50) = 800$$

66  
173  
# 3, 4, 6