11.2 Arithmetic Series

March 2

std. 22.0

ex. 1 **Find the sum of the 1st 10 positive even integers.**

$2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$ (a_1 = 2, a_{10} = 20)

$n = \frac{10}{2}(2+20) = 5(22) = 110$

sum of the 1st *n* terms of an arithmetic series: $S_A = n\left(\frac{a_1 + a_n}{2}\right)$

ex. 2 **Given the series 20 + 18 + 16 + 14 + . . .**

a) find the sum of the 1st 200 terms

$a_{200} = 20 + (199)(-2)$

$S_A = n\left(\frac{a_1 + a_n}{2}\right)$

$100\left(\frac{20 + -378}{2}\right) = -35{,}800$

b) find *n* such that S_n = -760 (sum)

$a_n = 20 + (n-1)(-2)$

$-760 = n\left(\frac{20 + 22 - 2n}{2}\right)$ (a_n)

$-760 = n(21 - n)$

$n^2 - 21n - 760 = 0$

$(n-40)(n+19) = 0$

$n = 40$ $\quad n = -19$

2 · 38

4 · 19

5 ·

ex. 3 **Find the sum** $\sum_{i=1}^{50} 20-5i$

$a_1 = 15$

$a_n = -230$

$n = 50$

$S_A = 50\left(\frac{15+-230}{2}\right)$

$S_A = -5{,}375$

ex. 4 **The bottom row of a store display has 30 cases of water. Each row has 1 less case than the row below it.**

a) Which row has 16 cases?

30, 29, 28, . . .

15th row

$a_n = a_1 + (n-1)d$

$16 = 30 + (n-1)(-1)$

$-14 = -1(n-1)$ $\quad n-1 = 14$

b) How many cases in the 1st 8 rows?

$S_8 = 8\left(\frac{30 + 23}{2}\right)$ (d_8)

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