p. 50-51   Arithmetic Series/Partial Sums

p. 50

Find the sum of the first 6 terms of each sequence

1) {1, 2, 3, 4, 5, 6 ...

$1 + 2 + 3 + 4 + 5 + 6 = 21$

2) {4000, +3750, +3500, **3250,** +3000, +2750 ...

20,250

Arithmetic Series/Partial Sum:

$$\frac{\text{Sum of terms of arithmetic Sequence}}{\text{\# of terms}}$$

We can find the partial sum of an arithmetic sequence with this formula

\# of terms

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

first   last
term   term

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

$$\{1 + 2 + 3 + \dots + 25\}$$

1.) Find the sum of the first 25 integers, beginning with 1.

$$S_{25} = \frac{25}{2}(1 + 25) = \boxed{325}$$

2.) Find the sum of the first 7 terms of an arithmetic
sequence if $a_1 = 4$ and $a_7 = 46$ $n = 7$

first last

$$S_7 = \frac{7}{2}(4 + 46) = \boxed{175}$$

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

3.) A national engineering organization is holding a competition in which
the top 8 finishers win cash prizes. First place receives a cash prize of
$5000, second place receives $4500, third place receives $4000, and so on.
What is the TOTAL amount of prize money? $n = 8$ $a_1 = 5000$

$$a_8 = 5000 + (8-1)(500)$$
$$a_8 = \$1500$$
$$a_8 = 1500$$
$$S_8 = \frac{8}{2}(5000 + 1500) = \boxed{\$26000}$$

4.) A theater has 32 rows of seats. There are 26 seats in the 1st row,
and 150 seats in the 32nd row. How many TOTAL seats are there?

$$n = 32$$
$$a_1 = 26$$
$$a_{32} = 150$$

$$S_{32} = \frac{32}{2}(26 + 150)$$
$$S_{32} = \boxed{2816 \text{ Seats}}$$

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

5) Consider a savings plan for yourself. You have never tried to save money before so you are going to take it slowly. At the end of the first week you are going to put $1.00 in the bank. Then at the end of the second week you are going to deposit $1.75 in the bank. At the end of the third week, you will deposit another $2.50 in the bank, and so on...

$d = 0.75$

How much money will you have saved in TOTAL at the end of the 20th week?

$n = 20 \qquad a_1 = \$1.00$

$a_{20} = 1.00 + (20-1)(.75) = \$15.25$

$S_{20} = \frac{20}{2}(1.00 + 15.25)$

$\boxed{\$162.50}$

Homework time!