Math 4
U8 L3 I2 Practice

Name Key

1. A new graduate accepts a job as a data processing clerk at a starting salary of $18,500 per year, with an annual increase of $750. Suppose he stays in the job for ten years. How much will he earn in total after 10 years?

$\sum_{i=1}^{10} 18,500 + 750(i-1)$

$a_1 = 18,500$
$a_n = 25,250$
$n = 10$
$d = 750$

$S_{10} = \frac{10}{2}(18,500 + 25,250)$

$S_{10} = \$218,750$

2. Find $\sum_{n=1}^{14}(-5n+3)$ using one of the arithmetic series formulas.

$a_1 = -2$
$a_n = -67$
$n = 14$
$d = -5$

$S_{14} = \frac{14}{2}(-2 + -67)$

$= -483$

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

$S_n = \frac{a_1(1-r^n)}{1-r}$

3. Evaluate the following sums:

a. $\sum_{n=1}^{7}(2n+7)$

$S_7 = \frac{7}{2}(9 + 21)$

$= \frac{7}{2} \cdot 30 = 7 \cdot 15$

$= 105$

b. $\sum_{i=1}^{5}(3i-6)$

$S_5 = \frac{5}{2}(-3 + 9)$

$= \frac{5}{2} \cdot 6$

$= 15$

4. You borrowed $6000 and agreed to pay it back over 5 years. Your **monthly** payments were

$145, $144.25, $143.50, $142.75,….,$100.75

$\sum_{i=1}^{60} 145 - .75(i-1)$

a. How much did you pay over the life of the loan?

$a_1 =$
$a_n =$
$n =$
$d =$

$S_n = \frac{60}{2}(145 + 100.75)$

$S_n = \$7372.50$

$145 - .75(i-1) = 100.75$

$i = 60$

b. How much interest did she pay on this loan? That is, how much over $6000 did she have to pay back?

$1372.50

5. Find the sum of the following series: $\sum_{i=2}^{6} 2(3)^{i-1}$

$S_5 = \frac{6(1-3^5)}{1-3} = 726$

6. Find the partial sum of the following series: $\{1.01 + 2.02 + 4.04 + 8.08 + \ldots + 4236247.04\}$

$\sum_{i=1}^{23} 1.01(2)^{i-1}$

$4236247.04 = 1.01(2)^{i-1}$

$4194304 = 2^{i-1}$

$S_{23} = \frac{1.01(1-2^{23})}{1-2} = 8,472,493.07$

$\frac{\ln(4194304)}{\ln(2)} = i-1$

$i = 23$

7. Because of air resistance, the length of each swing of a certain pendulum is 85% of the length of the previous swing. If the first swing has a length of 40 cm, find the total length the pendulum will swing before coming to rest.

Find the sum of the following series (if it exists. . .)

8. $\frac{1}{6} + \frac{1}{3} + \frac{2}{3} + \ldots$

9. $15 + 10 + \frac{20}{3} + \frac{40}{9} + \ldots$

10. $3 - \frac{9}{2} + \frac{27}{4} - \frac{81}{8} + \ldots$

11. $\sum_{n=1}^{\infty} -6\left(\frac{2}{3}\right)^{n-1}$