Ch. 1 Reviews

Note Title 2/10/2014

1. 8, 3, −2, −7, ... which term is −5002 *arithmetic*

$t_n = -5002$
$n = ?$
$t_1 = 8$
$d = -5$

$-5002 = 8 + (n-1)(-5)$
$-8 \quad -8$
$-5010 = -5n + 5$
$-5 \quad -5$
$\frac{-5015}{-5} = \frac{-5n}{-5}$ → $\boxed{n = 1003}$

2. Determine the sum of S_n *geometric*

$-700 + 350 - 175 + \ldots + 5.46875$

$t_1 = -700$
$r = \frac{350}{-700} = -\frac{1}{2}$
$t_n = 5.46875$
$n = ?$

$t_n = t_1 \cdot r^{n-1}$
$\frac{5.46875}{-700} = \frac{(-700)(-\frac{1}{2})^{n-1}}{-700}$
$-0.0078125 = (-0.5)^{n-1}$ *guess*

$-0.0078125 = (-0.5)^7$
$\therefore n = 8$

$S_8 = \frac{-700\left(1 - (-\frac{1}{2})^8\right)}{1 - (-\frac{1}{2})}$
$= \boxed{-464.8}$

3. $S_3 = 28.5$, $S_4 = 48.75$, and $S_5 = 79.125$
What is the first term of this geometric series?

$t_1 \quad t_2 \quad t_3 \quad t_4 \quad t_5$
$\_\_ + \_\_ + \_\_ + 20.25 + 30.375$

$S_3 = 28.5$
$S_4 = 48.75$
$S_5 = 79.125$

$t_5 = S_5 - S_4$
$= 79.125 - 48.75$
$= 30.375$

$t_4 = S_4 - S_3$
$= 48.75 - 28.5$
$= 20.25$

$r = \frac{30.375}{20.25} = 1.5$

$6 \quad 9 \quad 13.5 \quad 20.25$
$\div 1.5 \quad \div 1.5 \quad \div 1.5$

$\boxed{t_1 = 6}$

4. A ball is dropped from a height of 20 feet. Each time it bounces, it rebounds to 80% of its previous height. Determine the total vertical distance the ball has travelled after it hits the ground for
a) the third time?
b) the ninth time?

5. In an arithmetic sequence:
$t_1 = 4.5$ and $t_{20} = 58.5$, what is S_{15}?

$\underset{t_1}{4.5}\ \underset{t_2}{\_}\ \underset{t_3}{\_}\ \underset{t_4}{\_}\ \dots\ \underset{t_{19}}{\_}\ \underset{t_{20}}{58.5}$

$4.5 + 18d = 58.5$
$-4.5 \qquad -4.5$

$18d = 54$

$\boxed{d = 3}$

$\underset{t_1}{1.5}\ \underset{t_2}{4.5}$ $\quad +3$

$S_n = \frac{n(2t_1 + (n-1)d)}{2}$

$S_{15} = \frac{15(2(1.5) + (15-1)(3))}{2}$

$= \frac{15(3 + 14(3))}{2}$

$= \boxed{337.5}$

6. Determine the value of x in the following arithmetic sequence:

$\underset{t_1}{3x-6},\ \underset{t_2}{4+2x},\ \underset{t_3}{19}$

Arithmetic means: $t_2 - t_1 = t_3 - t_2$

$(4+2x) - (3x-6) = 19 - (4+2x)$
$4 + 2x - 3x + 6 = 19 - 4 - 2x$
$-x + 10 = 15 - 2x$
$+2x \quad +10 \quad -10 \quad +2x$

$\boxed{x = 5}$

7. Determine the number of terms of the following sigma notations, then determine the sum.

a) $\sum_{k=1}^{5} k$

# of terms:

$5 - 1 + 1 = 5$

$(1) + (2) + (3) + (4) + (5)$

$= 15$

b) $\sum_{k=1}^{7} (2k-1)$

# of terms:

$7 - 1 + 1 = 7$

$(2(1)-1) + (2(2)-1) + (2(3)-1) + (2(4)-1)$
$+ (2(5)-1) + (2(6)-1) + (2(7)-1)$

$= 49$

c) $\sum_{k=1}^{8} 2 \cdot 3^{k-1}$