Mathematics 20-1
Sequences and Series
Final Exam Review Assignment

Name: Answers
Date: _____

1. Given this arithmetic sequence. 6, 9.5, 13, 16.5.....
   a) Determine the simplified general term t_n

$t_n = t_1 + d(n-1)$
$t_n = 6 + 3.5(n-1)$
$t_n = 6 + 3.5n - 3.5$
$t_n = 3.5n + 2.5$

   b) Determine the term t_{12}

$t_{12} = 3.5(12) + 2.5$
$t_{12} = 44.5$

2. For the arithmetic sequence $t_6 = 86$ and $t_9 = 50$, determine t_{15}

$t_6 - - t_9$
$t_9 = t_6 + 3d$
$50 = 86 + 3d$
$-36 = 3d$
$\frac{-36}{3} = \frac{3d}{3}$
$-12 = d.$

$t_{15} = t_9 + 6d$
$t_{15} = 50 + 6(-12)$
$t_{15} = 50 + -72$
$\boxed{t_{15} = -22}$

3. In the arithmetic sequence -16, 5, 26, 47.....what is the number of the term whose value is 866?

$t_1 = -16$
$d = 21$

$t_n = -16 + (n-1)(21)$
$t_n = -16 + 21n - 21$
$866 = 21n - 37$
$903 = 21n$
$\boxed{n = 43}$

4. Find the sum of this arithmetic series 7 + 18 + 29 + ... + 381

$t_1 = 7$
$d = 11$

$t_n = 7 + (n-1)(11)$
$t_n = 7 + 11n - 11$
$t_n = 11n - 4$
$381 = 11n - 4$
$385 = 11n$
$n = 35$

$S_n = \frac{n}{2}(t_1 + t_n)$
$S_{35} = \frac{35}{2}(7 + 381)$
$\boxed{S_{35} = 6790}$

5. A theater has 60 seats in the first row, 68 seats in the second row, 76 seats in the third row, and so on in the same increasing pattern. If the theater has 20 rows of seats, how many seats are in the theater?

60, 68, 76, ...
$t_1 = 60$
$d = 8$

$t_n = 60 + (n-1)(8)$
$t_n = 60 + 8n - 8$
$t_n = 8n + 52.$

$t_{20} = 8(20) + 52$
$t_{20} = 160 + 52$
$t_{20} = 212.$

$S_{20} = \frac{20}{2}(t_1 + t_n)$
$S_{20} = 10(60 + 212)$
$\boxed{S_{20} = 2720}$

6. Given that $t_2=20$ and $t_4=500$. Determine the general term for the geometric sequence and t_8.

$t_4 = t_2 \cdot r^2$

$\frac{500}{20} = \frac{20 \cdot r^2}{20}$

$r^2 = 25$ or

$r = 5$ $r = -5$

$t_1 = 4$ $t_1 = -4$

$t_n = t_1 \cdot r^{n-1}$

$t_n = 4 \cdot 5^{n-1}$

$t_8 = 4 \cdot 5^{8-1}$

$t_8 = 4 \cdot 5^7$

$t_8 = 312,500$

$t_8 = -4(-5)^7$

$t_8 = 312,500$

7. Calculate S_6 given the geometric series 4-8+16-32+...

$t_1 = 4$

$r = -2$

$t_n = t_1 \cdot r^{n-1}$

$t_6 = 4 \cdot (-2)^5$

$t_6 = -128$

$S_6 = \frac{t_1(r^6 - 1)}{r-1}$

$S_6 = \frac{4((-2)^6 - 1)}{-2-1}$

$S_6 = \frac{4(64-1)}{-3}$

$S_6 = -84$

8. Determine the sum of this geometric series. 3+12+48+...+49152

$t_1 = 3$

$r = 4$

$t_n = t_1 \cdot r^{n-1}$

$\frac{49152}{3} = \frac{3 \cdot 4^{n-1}}{3}$

$16384 = 4^{n-1}$

$4^7 = 4^{n-1}$

$n = 8$

$S_8 = \frac{t_1(r^8 - 1)}{8-1}$

$S_8 = \frac{3(4^8 - 1)}{7}$

$S_8 = \frac{3(65535)}{7}$

$S_8 = \frac{196605}{7}$

9. The third term of a geometric sequence is 3 and the sixth term is 1/9. Find the first term.

$t_3 \text{ -- } t_6$

$t_6 = t_3 \cdot r^3$

$\frac{1}{9} = \frac{3r^3}{3}$

$\frac{1}{9} \cdot \frac{1}{3} = r^3$

$\sqrt[3]{\frac{1}{27}} = \sqrt[3]{r^3}$

$r = \frac{1}{3}$

$t_3 = 3$

$t_2 = 9$

$t_1 = 27$

10. a) State the general term of this geometric sequence. 32, 16, 8, 4.....

$t_n = t_1 \cdot r^{n-1}$

$t_n = 32 \cdot (\frac{1}{2})^{n-1}$

b) Find the value of the infinite series.

$S_\infty = \frac{t_1}{1-r}$

$S_\infty = \frac{32}{1-\frac{1}{2}}$

$S_\infty = \frac{32}{\frac{1}{2}}$

$S_\infty = 32 \cdot 2$

$S_\infty = 64$