Pre-Calculus
Sequences & Series Extra Review

Name: Key

**To earn credit, you must have the correct answer with all work shown.**

1. Write the following series using summation notation: $5 - 6 - 17 - 28 - 39 - 50 - 61 - 72$. 1.

$\sum_{n=1}^{8} -11n + 16$

(A) $a_1 = 5$, $d = -11$

$a_n = 5 + (n-1)(-11) = -11n + 16$

$-72 = -11n + 16$, $n = 8$

2. Write a rule for the $n$th term of the **arithmetic** sequence: $a_7 = 12$, $a_{37} = 222$ 2.

$12 = a_1 + (6)d$

$222 = a_1 + 36d$

$210 = 30d$

$d = 7$

$a_1 = -30$

$a_n = -30 + (n-1)(7)$

$a_n = 7n - 37$

3. Find $a_{39}$ for the **arithmetic** sequence: 7, 11, 15, 19, …. 3.

$a_1 = 7$, $d = 4$

$a_n = 7 + (n-1)(4)$

$a_n = 4n + 3$

$a_{39} = 4(39) + 3$

$= 159$

4. Find $S_{39}$ for the **arithmetic** series $7 + 11 + 15 + 19 + \ldots$. 4.

$S = \frac{39}{2}(7 + 159)$

$= 3237$

5. Find $n$ if $S_n = 10{,}437$ for the **arithmetic** series $7 + 11 + 15 + 19 + \ldots$. 5.

$10437 = \frac{n}{2}(7 + a_n)$

$a_n = 4n + 3$

$0 = 4n^2 + 10n - 20874$

71 + -147

6. Find the sum of the following infinite series, if possible: $\sum_{n=1}^{\infty} 15\left(-\frac{12}{11}\right)^{n-1}$ (G) 6.

not possible, $|r| > 1$ so diverge

7. Find the sum of the following infinite series, if possible: $\sum_{n=1}^{\infty} \frac{2}{5}\left(\frac{2}{7}\right)^{n-1}$ (G) 7.

$S = \frac{\frac{2}{5}}{1 - \left(\frac{2}{7}\right)}$

$n = 1$ is $\frac{2}{5}$, meaning $a_1 = \frac{2}{5}$

$\frac{14}{25}$

8. Find the sum of the first 12 terms of the **geometric** series: $2 - 8 + 32 - 128 + \ldots$ 8.

$a_1 = 2$

$r = -4$

$S_{12} = 2\left(\frac{1 - (-4)^{12}}{5}\right)$

$= -6710886$

9. Use the series in #8 to find $n$ when $S_n = -1638$. G 9._____

$-1638 = 2\left(\frac{1-(-4)^n}{5}\right)$

$4096 = (-4)^n$ $n = 6$

10. Write a rule for the $n$th term of the **geometric** sequence: $a_4 = 500$, $a_8 = 312{,}500$? 10._____

$500 = a_1 r^3$ $312500 = a_1 r^7$ $625 = r^4$ $r = 5$ $a_1 = 4$ $a_n = 4(5)^{n-1}$

11. In a **geometric** sequence, $a_4 = -24$ and $a_7 = -192$. Find $a_{14}$. 11._____

$-24 = a_1 r^3$ $-192 = a_1 r^6$ $8 = r^3$ $r = 2$ $a_1 = -3$ $a_{14} = -3(2)^{14-1}$ $-24576$

12. In the **arithmetic** sequence $a_6 = 16$ and $a_{12} = 46$. Find $a_{150}$. 12._____

$16 = a_1 + 5d$ $46 = a_1 + 11d$ $30 = 6d$ $d = 5$ $a_1 = -9$ $a_{150} = -9 + (150-1)(5)$ $= 736$

13. What term number is 756 in the sequence 405,414,423…756? A 13._____

$a_1 = 405$ $d = 9$ $a_n = 405 + (n-1)(9)$ $a_n = 9n + 396$ $756 = 9n + 396$ $n = 40$

14. Find the common ratio of the infinite geometric series with the given sum and first term: $S = \frac{7}{8}$, $a_1 = \frac{3}{10}$

G

$\frac{7}{8} = \frac{\frac{3}{10}}{1-r}$ or $.875 = \frac{.3}{1-r}$ 14._____

$1 - r = \frac{.3}{.875}$ $= \frac{23}{35}$

Answer Key

1) $\sum_{n=1}^{\infty} -11n + 16$ 2) $a_n = 7n - 37$ 3) 159 4) 3237 5) 71

6) diverges; no sum 7) $\frac{14}{25}$ 8) $-6710886$ 9) 6 10) $a_n = 4(5)^{n-1}$

11) $-24576$ 12) 736 13) 40 14) $\frac{23}{25}$