PreCalculus
WS: Chapter 14 Review

Name Key 2017
Date 6/2, 6/5 Block 1A, 2B

In 1 – 4, do the following:

a.) Identify whether the sequence is arithmetic, geometric, or neither.
b.) If arithmetic or geometric, identify the common difference or common ratio.
c.) If arithmetic or geometric, write a recursive rule.
d.) Write an explicit rule.
e.) Find a_{13}.

1.) 5, 2 -1, -4, -7, …

Arithmetic, $d = -3$

$a_n = a_{n-1} - 3$ where $a_1 = 5$

$a_n = 5 - 3(n-1)$

$a_{13} = -31$

2.) $1, \frac{1}{8}, \frac{1}{27}, \frac{1}{64}, \frac{1}{125}, \ldots$

Neither

$a_n = \frac{1}{n^3}$

$a_{13} = \frac{1}{13^3} = \frac{1}{2197}$

3.) 5, -15, 45, -135, …

Geometric, $r = -3$

$a_n = a_{n-1} \cdot (-3)$ where $a_1 = 5$

$a_n = 5(-3)^{n-1}$

$a_{13} = 2,657,205$

4.) 1, 8, 17, 28, 41, …

Neither

$a_n = n^2 + 4(n-1)$

$a_{13} = 217$

5.) Find the sum of the first 55 terms for the series: 4 + 11 + 18 + 25 + …

Arithmetic, $d = 7$

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

$a_{55} = 382$

$S_{55} = \frac{55(4+382)}{2} =$

$S_{55} = 10,615$

6.) For the given series, 105 + 111 + 117 + …, find which term gives the sum of 6336.

Arithmetic, $d = 6$

$a_n = 105 + 6(n-1)$

$a_n = 6n + 99$

$6336 = \frac{n(105 + 6n + 99)}{2}$

$12672 = 6n^2 + 204n$

$6n^2 + 204n - 12672 = 0$

$n = \frac{-204 \pm 588}{12}$

$n = 32$

7.) Find "n" if you know that $S_n = 59{,}046$ in the series $6 + 18 + 54 + 162\ldots$

Geometric, $r = 3$

$a_n = 6 \cdot 3^{n-1}$

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

$59046 = 6\left(\frac{1-3^n}{1-3}\right)$

$19683 = 3^n$

$n = \log_3 19683 = 9$

8.) Find: $\sum_{n=1}^{8}\left(-2n^2 + 7n\right) = -156$

$n = 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$

$5 + 6 + 3 + -4 + -15 + -30 + -49 + -72$

9.) Write the following in summation notation: $5 + 10 + 15 + 20 + \ldots + 60$.

$\sum_{k=1}^{12} 5k$

3, 5, 7

10.) A runner begins training by running 3 miles one week. The second week she runs a total of 5 miles. The third week she runs 7 miles. Assume this pattern continues.

Arithmetic, $d = 2$

$a_n = 3 + 2(n-1)$

a.) How far will she run in the tenth week?

$a_{10} = 3 + 2(9) = 21$ miles

b.) At the end of the tenth week, what will be the total distance she has run since she started training?

$S_{10} = \frac{10(3+21)}{2} = 120$ miles

c.) Express the total distance with summation notation.

$\sum_{k=1}^{10} 2k+1$

11.) Use patterns in Pascal's Triangle to complete the next row.

1 11 55 165 330 462 462 330 165 55 11 1

1 12 66 220 495 792 924 792 495 220 66 12 1

12.) Find the coefficient of the x^3y^2 term in the expansion of $(2x-y)^5$.

1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

$10(2x)^3(-y)^2 =$

$80x^3y^2$

13.) Fully expand and simplify the binomial: $(2x+y)^6$.

$(2x)^6(y)^0 + 6(2x)^5(y) + 15(2x)^4(y^2) + 20(2x)^3(y^3) + 15(2x)^2(y^4)$
$+ 6(2x)(y)^5 + (2x)^0(y)^6$

$64x^6 + 192x^5y + 240x^4y^2 + 160x^3y^3 + 60x^2y^4 + 12xy^5 + y^6$

14.) Find the fifth term (simplified) in: $(3x-2y)^7$

$k=4$
$n=7$
$a=(3x)$
$b=(-2y)$

$\binom{7}{4}(3x)^3(-2y)^4$

$35(27x^3)(16y^4)$

$15120x^3y^4$