## Alg 2 Sequence & Series Test Review

## Sequence & Series Test Review Key

1a.  $d = \frac{1}{8}$ , Arithmetic; b. Neither; c. r=-3, Geometric

 $2a. 4, 2, 1, \frac{1}{2}$ , Recursive; b. 1, -3, -7, -11, Explicit

3. -14

4. 12, -12

5. 8000

6. 125

7. f(n) = -19 + 6n

8.  $a_n = 7 \left(\frac{1}{4}\right)^{n-1}$  or  $a_n = \frac{7}{4^{n-1}}$ 

9. -7

10. (c)

11.  $\sum_{n=1}^{8} \frac{1}{27} (3)^{n-1}$  or  $\sum_{n=-3}^{4} 3^n$  or  $\sum_{n=1}^{8} 3^{n-4}$ 

12. 236.35

13a.  $S_n = \frac{2500(1-1.05^n)}{1-1.05}$  or  $S_n = \frac{2500-2500(1.05^n)}{1-1.05}$ 

13ь. \$70,331

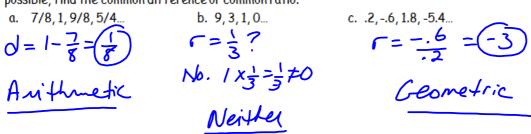
## Alg 2 Sequence & Series Test Review

Arithmetic Sequence: 
$$a_n = a_1 + d(n-1)$$

Geometric Series

$$S_n = \frac{a_1(1-r^n)}{1-r} = \frac{a_1 - a_1r^n}{1-r}, \text{ where } r \neq 1$$

Determine whether each of the following sequences could be arithmetic, geometric or neither.
 If possible, find the common difference or common ratio.



2. Find the first four terms of the sequence and tell if the formula is explicit (E) or recursive (R).

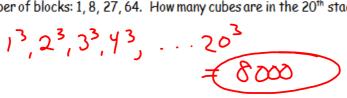
a. 
$$a_1 = 4$$
 and  $a_n = \frac{1}{2}(a_{n-1})$   
b.  $a_n = 5 - 4n$   
 $a_1 = 4$   
 $a_2 = \frac{1}{2}(4) = 2$   
 $a_3 = \frac{1}{2}(2) = 1$   
 $a_4 = \frac{1}{2}(1) = \frac{1}{2}$   
b.  $a_n = 5 - 4n$   
 $a_1 = 5 - 4(1) = 1$   
 $a_2 = 5 - 4(2) = 5 - 8 = -3$   
 $a_3 = 5 - 4(3) = 5 - 10 = -7$   
 $a_4 = \frac{1}{2}(1) = \frac{1}{2}$   
 $a_4 = 5 - 4(4) = 5 - 16 = -16$ 

3. A sequence is defined by  $a_n = 2a_{n-1} + a_{n-2}$  with  $a_1 = 3$  and  $a_2 = -4$ . Determine the value of  $a_4$ .

$$\alpha_3 = 2(\alpha_2) + \alpha_1 = 2(-4) + 3 = -8 + 3 = -5$$
  
 $\alpha_4 = 2(\alpha_3) + \alpha_2 = 2(-5) + -4 = -10 - 4 = -14$ 

4. Find the missing term in this geometric sequence:  $36, _{-}, 4$ .

5. Stacks of ice blocks are formed to represent a pattern. The first 4 stacks have the following number of blocks: 1, 8, 27, 64. How many cubes are in the  $20^{th}$  stack? Justify your answer.



6. A sequence is defined using the rule  $a_n = 5a_{n-1} + 1$  with  $a_1 = 6$ . Find the value of  $a_3 - a_2$ .

$$\alpha_1 = 5(\alpha_1) + 1 = 5(6) + 1 = 31$$
  
 $\alpha_3 = 5(\alpha_2) + 1 = 5(31) + 1 = 156$   
 $\alpha_3 - \alpha_2 = 156 - 31 = 125$ 

7. f(n) = f(n-1) + 6 and f(1) = -13 represents a recursive formula. Write an explicit formula for the same sequence.

fine sequence.  

$$f(2) = f(1) + b = -13 + 6 = -7$$
 )+6  $f(\lambda) = f(1) + d(\lambda - 1)$   
 $f(3) = f(2) + 6 = -7 + 6 = -1$  )+6  $f(\lambda) = -13 + 6(\lambda - 1)$   
 $f(4) = f(3) + 6 = -1 + 6 = 5$   $f(\lambda) = -13 + 6\lambda - 6$   
Arithmetic,  $d = 6$   $f(\lambda) = -19 + 6\lambda$ 

$$f(n) = f(1) + d(n-1)$$

$$f(n) = -13 + 6n - 6$$

$$f(n) = -19 + 6n$$

8. A geometric sequence is given below. Find an explicit formula for the <u>nth term</u> of this sequence.  $7, \frac{7}{4}, \frac{7}{16}, \frac{7}{64}, \frac{7}{256}, \dots$ 

$$7, \frac{7}{4}, \frac{7}{16}, \frac{7}{64}, \frac{7}{256}, \dots$$

$$C = \frac{7}{4}, = \frac{7}{4}, \frac{7}{7} = \frac{1}{4}$$

$$C = \frac{1}{4}, \alpha_1 = 7$$

$$a_n = a_1 c^{n-1}$$

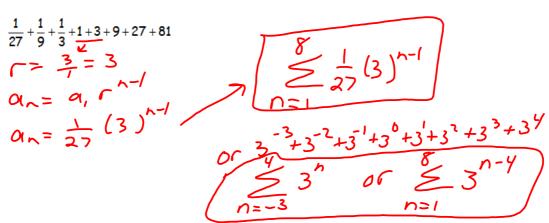
$$a_n = 7(\frac{1}{4})^{n-1}$$

$$a_n = \frac{7}{4}$$

$$a_n = \frac{7}{4}$$

9. If 
$$f(x) = \sum_{n=2}^{4} (n^2 + xn)$$
, then  $f(-4) = \sum_{n=2}^{9} (n^2 + -4/n) = \sum_{n=2}^{9} (n^2 + -4$ 

11. Express the following sum using summation (sigma) notation.



12. Determine the <u>sum of a geometric series with 12 terms</u> whose <u>first term is 130</u> and whose common ratio is <u>0.45</u>. Round to the nearest <u>hundredth</u>. Use the <u>formula</u>.

$$n = 12, \ \alpha_1 = 130, \ c = .45$$

$$S_n = \frac{\alpha_1(1-r^n)}{(1-r^n)} \qquad S_{12} = \frac{130(1-.45^n)}{(1-.45)} = 236.35$$

- 13. Nicky is having a baby and the baby's grandparents plan to set up an education fund account to make deposits annually starting on the baby's first birthday. The first deposit will be \$2500 with each deposit being increased by 5% each year.
  - a. Write a geometric series formula,  $S_n$ , for the total deposited amount over n years.

$$a_1 = 2500,$$
  $r = 1 + .05 = 1.05$   $S_n = \frac{2500(1 - 1.05^r)}{1 - 1.05}$ 

b. Find the account's total deposited amount to the nearest dollar at the end of 18 years.

$$S_{18} = \frac{2500(1-1.05^{18})}{1-1.05} = 70330.9616... \approx $70,331$$