Math 116 10.1 – 10.3 Review Worksheet

1. What is the fifth term of the sequence defined by $a_n = 3n-1$?

$a_5 = 3(5)-1$

A) 2 B) 8 C) 14 D) 20 E) 26

2. What type of sequence is described by the rule $a_n = 3n-1$? arithmetic

3. What is the next term in the sequence 1, 6, 11, 16, 21, … ? $d=5$

A) 23 B) 26 C) 28 D) 30 E) 32

4. Which of the following is an arithmetic sequence?

A) 2,4,8,14,22,… B) 1,5,6,10,11,… C) 3,9,21,39,63,…

D) -3,0,6,15,27,… E) 3,8,13,18,23,… $d=5$

5. What is a rule for the nth term of the arithmetic sequence with $a_{10} = 22$ and a common difference $d = 3$?

$a_n = a_1 + (10-1)3$

$-5 = a_1$

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

$a_n = 3n - 8$

A) $a_n = 3n-2$ B) $a_n = 3n-8$ C) $a_n = 3n+4$

D) $a_n = 3n-6$ E) $a_n = 3n+5$

6. Which series is represented by $\sum_{n=0}^{9}(5n+3)$?

$a_0 = 5(0)+3$ $a_9 = 5(9)+3$

$a_0 = 3$ $a_9 = 48$

A) $8+13+18+...$ B) $8+13+18+...+48$ C) $8+13+18+...+53$

D) $3+8+13+...+48$ E) $3+8+13+...$

7. What is the partial sum of $\sum_{n=0}^{9}(5n+3)$?

$S_{10} = \frac{10}{2}(3+48) = 255$

8. What is the partial sum of the series $-1+3+7+...+(4n-5)$

$S_n = \frac{n}{2}(-1+4n+5)$

$= \left(\frac{n}{2}\right)(4n-6)$

$2n^2 - 3n$

9. Which of the following is an geometric sequence?

(A) 1, 2, 4, 8, 16, … $r=2$ B) $-3,1,5,9,...$ C) 4, 8, 24, 96, 480,…

D) $-5,0,10,25,30,...$ E) $-2,-4,8,16,-32,...$

10. What is a rule for the n^{th} term of the geometric sequence $-3,-6,-12,-24,-48,...$? $a_n = (-3)(2)^{n-1}$

A) $a_n = 2(-3)^{n-1}$ (B) $a_n = -3(2)^{n-1}$ C) $a_n = 3(-2)^{n-1}$

D) $a_n = -3(-2)^{n-1}$ E) $a_n = -2(3)^{n-1}$

11. What is the partial sum of the series $2+6+18+...+39{,}366$?

$a_n = 2(3)^{n-1}$

$39{,}366 = 2(3)^{n-1}$ $19{,}683 = 3^9$

$S = \frac{2(1-3^{10})}{1-3}$ 59,048

12. Write the following series in Sigma Notation: $\frac{1}{2}+\frac{2}{3}+\frac{3}{4}+...+\frac{9}{10}$ $\sum_{n=1}^{9} \frac{n}{n+1}$

13. Which type of sequence (arithmetic or geometric) is similar to a linear function? Why?

Common difference same as slope

Solve the following sums.

14. $\sum_{n=0}^{5} 7$ 42

15. $\sum_{n=1}^{5} 7n-3$ $\frac{5}{2}(4+32)$ 90

16. $\sum_{n=1}^{15} \left(\frac{7}{2}\right)^n$ $\frac{\frac{7}{2}(1-\frac{7}{2}^{15})}{1-\frac{7}{2}}$ 202837709.6

17. $\sum_{n=1}^{\infty} \left(\frac{9}{10}\right)^n$ $S = \frac{9/10}{1-9/10}$ 9

18. $\sum_{n=1}^{100} \left(6-\frac{1}{2}n\right)$ -1925

$\frac{100}{2}\left(\frac{11}{2}+(-44)\right)$

19. $\sum_{n=1}^{\infty} 3\left(\frac{1}{10}\right)^n$ $S = \frac{3/10}{1-1/10}$ $\frac{1}{3}$

Evaluate the factorials.

20. $6! \cdot 3!$ 4320

21. $\frac{8!}{4!4!}$ $\frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4!}{4 \cdot 3 \cdot 2 \cdot 4!}$ 70

22. $\frac{n!}{(n+2)!}$ $\frac{n!}{(n+2)(n+1)\,n!}$ $\frac{1}{(n+2)(n+1)}$

23. A child building a tower with blocks uses 15 for the bottom row. Each row has 2 fewer blocks than the previous row. Suppose that there are 8 rows in the tower.

a) How many blocks are used for the top row? 1

b) What is the total number of blocks in the tower? 64

$a_8 = 15 + (8-1)(-2)$

$S_8 = \frac{8}{2}(15+1)$

24. An insect population is growing in such a way that each new generation is 1.5 times as large as the previous generation. Suppose there are 100 insects in the first generation.

$a_n = 100(1.5)^{n-}$

a) How many will there be in the fifth generation? 506.25 or 506

$a_5 = 100(1.5)^4$

b) What will be the total number of insects in the five generations?

1318.75 or 1319

$S_5 = \frac{100(1-1.5^5)}{1-1.5}$

25. In 2013, the number of students in a small school is 284. It is estimated that the student population will increase by 4% each year.

a) Write a formula for the student population. $a_n = 284(1.04)^{n-1}$

b) Estimate the student population in the year 2021. $a_{2021} = 284(1.04)^{8-1} = 373.725$

374 STUDENTS

26. A high school band marches onto the football field in a pyramid formation. The drum major leads the band alone in the first row. There are two members in the second row, three in the third row and so on. The pyramid formation has 15 rows. How many members does the band have?

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

120 MEMBERS

27. Mr. Imabuffdude spent a year training for his mega triathlon.
On January 1st, he swam 1 mile.
On January 2nd, he swam 1.1 miles.
On January 3rd, he swam 1.21 miles.
On January 4th, he swam 1.331 miles.

a) Write a rule for the geometric sequence. $a_n = (1.1)^{n-1}$

b) How far did Mr. Imabuffdude swim on the 150th day of the year?

1470652.578 miles

28. Given the sequence $1, -2, 4, -8, 16, -32, \ldots$,

Danny wrote the rule as $a_n = (-2)^{n-1}$, Maynard wrote the rule as $a_n = (-2)^n$,

Justin wrote the rule as $a_n = (-2)^{n+1}$ and Adam wrote it as $a_n = -(2)^{n-1}$.

Who is (are) right and why?

DANNY IF n STARTS AT $n=1$

MAYNARD IF n STARTS AT $n=0$