Math 126 Unit 9 Review Name _____

1. Consider the sequence given by 5, 8, 11, 14, 17, 20, …

   a) Is this an arithmetic sequence or geometric sequence?

   b) Write a recursive rule for the nth term in the sequence.

   c) Write an explicit rule for the nth term in the sequence.

   d) Find the sum of the first 30 terms.

2. Write the first four terms of the arithmetic sequence $a_n = 5n + 2$.

3. Write the first four terms of the sequence: $a_1 = 24$
   $a_n = a_{n-1} - 2$

4. If a_n is an arithmetic sequence with $a_4 = 23$ and $a_9 = 38$, find a_0.

5. Evaluate:
   $\sum_{i=1}^{4} 5i - 1$

6. Consider the sequence $\frac{1}{6}, \frac{3}{6}, \frac{5}{6}, \frac{7}{6}, \ldots$

   a) Write an explicit rule for a_n.

   b) Write (and simplify) a rule for S_n.

7. Austin decides to use Khan Academy to study for the SAT. His goal is study at least 40 hours for the exam. He spends 21 minutes on the first day, 23 minutes on the second day, 25 minutes on the third day, and so on.

   a) How many minutes **total** has he studied by the end of the 15^{th} day? How many hours is that?

   b) What's the minimum number of days he will need to set aside so that he has a total of **40 *hours*** by the time he takes the exam? Show use of formulas to arrive at your answer.

8. Which is bigger?

   → The **common ratio, r**, in a **geometric** sequence with $a_2 = 24$ and $a_5 = 1536$

   OR

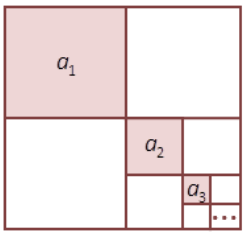
   → The **common difference, d**, in an **arithmetic** sequence with $a_4 = 16$ and $a_7 = 31$

9. Find the sixth term of the geometric sequence: $a_n = 10(2)^n$

10. Joelle started working for a company in January of 2012. She receives an annual raise each January which is a fixed percentage of her previous year's wages. In 2012 she earned $60,000, in 2013 her annual salary was $61,800 and in 2018 she made $71,643.14.

    Decide if this scenario describes an arithmetic or geometric sequence, then write an explicit rule that gives her annual income after working at the company for *n* years.

11. How much (what fraction) of the square will eventually be shaded if the shading pattern (in the shapes of squares) is continued **indefinitely** from the top left to the bottom right? Support your answer with a mathematical argument.



12. Find the sums ***or*** explain why they do not exist. Show your work.

    a. $\sum_{i=1}^{10} 5\left(\frac{1}{3}\right)^{i-1}$

    b. $\sum_{i=1}^{6} 16 - 2i$

    c. $\sum_{i=1}^{\infty} 3(\frac{7}{2})^{i-1}$

    d. $\sum_{j=1}^{\infty} 4(0.2)^{j-1}$

#13 – 16: Evaluate each expression

13. $\square_9P_4$

14. $\square_6P_2$

15. $\square_{10}C_6$

16. $\square_{11}C_4$

17. A medical researcher needs 6 people to test the effectiveness of an experimental drug. If 13 people have volunteered for the test, in how many ways can 6 people be selected?

18. Fifty people purchase raffle tickets. Three winning tickets are selected at random. If first prize is $1000, second prize is $500, and third prize is $100, in how many different ways can the prizes be awarded?