

Conceptual Problems

Please provide a short explanation for your answers in this section.

1. (3 points) **True/False** A sequence a_n can be both geometric and arithmetic. If true, give an example, if false, justify your reasoning.

2. (3 points) **True/False** $\sum_{j=1}^4 2^j = \sum_{j=3}^6 2^{j-2}$

Computational Problems: Part 1

3. (4 points) Find the domain of the function $f(x) = \frac{1}{\sqrt{x+1}-2}$.

4. (4 points) Write the complex number $\frac{3}{2-3i}$ in the form $a + bi$.

5.(4 points) Give the **standard form** of the equation of the line through the point $(1, -1)$ perpendicular to the line $2y - x = 3$.

6. (4 points) Use synthetic division to do divide the polynomials. Specify the quotient and the remainder.

$$(3x^4 + 3x^2 - 2x + 4) \div (x + 3)$$

7.(4 points) Find an absolute value inequality with solution set $[4, 26]$.

Computational Problems Part 2

8. (4 points) Write out the first five terms of the sequence $a_n = \frac{1}{n^2-1}$.

9.(4 points) Find a formula a_n for the apparent n th term of the sequence: $\frac{1}{3}, -\frac{1}{9}, \frac{1}{27}, -\frac{1}{81}, \frac{1}{243} \dots$

10. (4 points)

a. State the definition of $n!$ for an integer $n > 0$.

b. Simplify the expression $\frac{(n+2)!}{(n-1)!}$.

11. (4 points) The sequence 5, 30, 180, ... is geometric. Find the 10th term of the sequence.

12. (6 points)

a. Write down the formula for the sum of the first n positive integers $S_n = \sum_{i=1}^n i = 1 + 2 + \dots + n$.

b. Compute $\sum_{i=1}^{175} 2i$.

c. Compute $\sum_{i=176}^{300} 2i$.

13. (4 points) An object with negligible air resistance is dropped from a plane. During the first second of fall, the object falls 4.9 meters; during the second second, it falls 14.7 meters; during the third second, it falls 24.5 meters; during the fourth second, it falls 34.3 meters. If this pattern continues, how many meters will the object fall in 30 seconds?