Homework 2: Factorials, permutations, and sequences

HW2 is Due October 12; submit to Google classroom 15 minutes before the class time.

1. Let A = [1, 3] = {x | 1 ≤ x ≤ 3}, B = {x | x ≥ 2}, C = {x | x ≤ 1.5}.
    Draw on the number line the following sets: A ∩ C, A ∩ B ∩ C.

2. A group of 6 club members always dine at the same round table in the club; there are exactly 6 chairs at the table. They decided that each day, they want to seat in a different order. Can they keep this for a year? Two years?

3. In a computer game, a wizard is more powerful than an orc, so when a wizard fights an orc, he has 60% chance of winning. If a wizard fights one by one a group of 5 orcs, what are the chances that he will defeat them all?

4. In how many ways can one arrange 5 books on a shelf?

5. Write the first 5 terms of an arithmetic sequence if $a_3 = 7$ and $d = 12$

6. In arithmetic sequence a_5 = 27 and a_{27} = 60. Find the first term and the common difference.

7. Write the first 5 terms of a geometric progression if: $b_1 = -20$ and $q = \frac{1}{2}$

8. A geometric sequence has 99 terms, and the first term is 12 and the last term is 48. What is the 50th term?

9. Compute

$$\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \cdots + \frac{1}{2^{10}}$$

10. Find the infinite sum $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \cdots$

Note: *If you need more information and formulas for the arithmetic and geometric sequences, please see in Google classroom the notes I have attached in:*

Week2 -> Class notes Week 2 -> Arithmetic and Geometric sequences