

Homework 2: Factorials, permutations, and sequences

HW2 is Due October 4; submit to Google classroom 15 minutes before the class time.

- Let  $A = [1, 3] = \{x \mid 1 \leq x \leq 3\}$ ,  $B = \{x \mid x \geq 2\}$ ,  $C = \{x \mid x \leq 1.5\}$ .  
Draw on the number line the following sets:  $A \cap C$ ,  $A \cap B \cap C$ .
- 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?
- 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?
- In how many ways can one arrange 5 books on a shelf?
- Write the first 5 terms of an arithmetic sequence if  $a_3 = 7$  and  $d = 12$
- In arithmetic sequence  $a_5 = 27$  and  $a_{27} = 60$ . Find the first term and the common difference.
- Write the first 5 terms of a geometric progression if:  $b_1 = -20$  and  $q = \frac{1}{2}$
- A geometric sequence has 99 terms, and the first term is 12 and the last term is 48. What is the 50th term?
- Compute

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

- Find the infinite sum  $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots$

**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