

HOMEWORK 1 (MATH 180, SPRING 2014)

Read: MN, sections 1.1-4, 3.1-3 (second ed.)

Solve:

I. Throughout the problem, assume $n = 12$. Compute the number of permutations $(\sigma_1, \dots, \sigma_n)$ of $[n] = \{1, 2, \dots, n\}$, such that

- a) $\sigma_1 \cdot \sigma_n = 2$
- b) $\sigma_1 + \sigma_n = 2$
- c) $\sigma_1 + \sigma_n = n + 1$
- d) $\sigma_1 = n$ and $\sigma_n = 1$
- e) $\sigma_1 > \sigma_2 < \sigma_3$
- f) $\sigma_1 > \sigma_2 < \sigma_3 < \sigma_4$
- g) $\sigma_1 = 1$ or $\sigma_2 = 1$
- h) $\sigma_1 = 1$ or $\sigma_2 = 2$
- i) $\sigma_1 = 1$, or $\sigma_2 = 2$, or $\sigma_3 = 3$
- j) $\sigma_1 \leq 4$ or $\sigma_2 \geq 5$
- k) $\sigma_1 \leq 5$ and $\sigma_2 \geq 5$

II. Throughout the problem, assume $n = 10$ and $k = 4$. Compute the number of k -subsets A of $[n]$, such that:

- a) A contains 1 and n
- b) A contains 1 but not n
- c) A contains 1 or n
- d) A contains at least one integer ≤ 4
- e) A contains at least one integer ≤ 3 and is missing at least one integer ≤ 6
- f) A contains at least two integers ≤ 6
- g) A contains only odd integers
- h) A contains exactly one even integer
- i) the product of numbers in A is 30
- j) the product of numbers in A is ≤ 35

This Homework is due Wednesday April 9, at 12:59 pm. (right before class). Please read the collaboration policy on the course web page. Make sure you write your name in the beginning and your collaborators' names at the end. Box all answers. Remember that answers are not enough, you also need to provide an explanation exhibiting your logic.

P.S. Each item above has the same weight.