

Chapter 2.5 Combinations of Multisets

Let S be a multiset of k kinds of elements, each has its own multiplicity. A multisubset of size r is an r -combination.

Say $S = \{3 \cdot a, 3 \cdot b\}$. The all 4-combinations of S are $\{a, a, a, b\}$, $\{a, a, b, b\}$, $\{a, b, b, b\}$.

1: Let $S = \{\infty \cdot a, \infty \cdot b\}$. What is the number of r -combinations of S ?

2: Let $S = \{\infty \cdot a, \infty \cdot b, \infty \cdot c\}$. What is the number of r -combinations of S ?

3: Let S be a multiset of k different object, each has infinite supply. What is the number of r -combinations of S ?

4: What is the number of integer solution to the equation

$$x_1 + x_2 + x_3 = 5$$

subject to $x_1, x_2, x_3 \geq 0$.

5: I'm hungry and I want to buy 6 items from McDonald's. I can pick from Hamburger, Cheeseburger and small fries. How many different orders can I place?

6: What is the number of integral solutions of

$$x_1 + x_2 + x_3 + x_4 = 20$$

subject to $x_1 \geq 3, x_2 \geq 1, x_3 \geq 0, x_4 \geq 5$?

Read chapter 2.6 on your own.