

Combinatorics HW 2.1

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1. How many different permutations for word "Combinatorics"? (Case sensitive)

o appears twice; i appears twice

$$13!/2!/2! = 1556755200$$

2. The coefficient number of $a^2b^2c^2$ in the expanded equation of $(2a+b+c)^6$ is _____. 【Please calculate the exact number】

$$C(6,2) \times C(4,2) \times 2^2 = 360$$

3. For the case of giving fruits to 3 kids, in total there are 12 identical apples, each child may at least have one apple, how many different ways to give apples to 3 kids?

$$\sum x_i = 12 \text{ for } i \text{ from } 1 \text{ to } 3$$

$$x_i \geq 1 \quad \forall i$$

$$\text{Let } y_i = x_i - 1; y_i \geq 0$$

$$\sum y_i = 9 \text{ for } i \text{ from } 1 \text{ to } 3$$

$$C(9+3-1, 3-1) = 55$$

4. What is the number of integral solutions of the equation $x_1+x_2+x_3=30$, in which $x_1 \geq 5$, $x_2 \geq -8$, $x_3 \geq 5$.

$$\sum x_i = 30 \text{ for } i \text{ from } 1 \text{ to } 3$$

$$\text{Let } y_1 = x_1 - 5, y_2 = x_2 + 8, y_3 = x_3 - 5; y_i \geq 0$$

$$\sum y_i = 28 \text{ for } i \text{ from } 1 \text{ to } 3$$

$$C(28+3-1, 3-1) = 435$$