

MATH 461 Lecture 1 Note

James Liu

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multiplication rule

suppose 2 experiments are to be performed, if experiment 1 can result in m possible out comes, and for each outcomes in experiment 1, experiment 2 can result in n outcomes. Together, there will be $m \times n$ total possible out comes for this 2 experiment. Similarly, it can be easily generalized into n experiments: $\prod_1^n m_k$.

Examples

1. Suppose we need a 6 digit series number with first 3 digit being numbers and last 3 being letters. then how many series number we can make in total?

$$10^3 \times 26^3$$

2. A mother want to give her son a total of 14 cards in a 7 day period, suppose she only gives her son cards once a day, how many ways that she can choose to give her son all 14 cards?

7^{14} see each card as a seperate experiment then each card can be given in one of the seven days

Permutation

suppose we have n distinct objects we can put them in a ordinal arrangement, each of their arrangements is called a permutation, if there are n objects, then there will be $n!$ numbers of permutations.

Examples

1. John have 12 different books to be sorted on a shelf. 3 of them are math books, 3 of them are cs books, 4 of them are physics books and 2 of them are fictions. how many different ways he have to sort all these books on shelf if he want books with similar topic sit together?

$$4! \cdot (3! \cdot 3! \cdot 4! \cdot 2!)$$

permutation of subjects permutation of books

2. In how many ways can 6 people were to sit in a row and a,b needs to sit together?

$$2! \times 5!$$

3. In howmany ways can 4 male and 4 female be sitting in a role with no 2 people with similar gender sitting next to each other?

$$2! \cdot 4! \times 4!$$

4. Consider the word PEPPER, how many new words can such letter make including this one?

$$\frac{6!}{3!2!1!} \text{ as p and p are similar and overcountings must be illiminated.}$$