

# Exercises to Combinatorial Analysis

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1. How many different letter arrangements can be formed using the letters ABC? PEPPER?
2. A committee of 3 is delegated from a group of 13 people. How many different committees are possible? How many different committees are possible, if the delegated 3 represent different posts (president, secretary, cashier)?
3. How many different licence plates (3 letters – 3 digits) can be formed? (there are 26 letters and 10 digits available)
4. How many 3-digit numbers with decreasing digits can be made?
5. Two teams of equal size are formed randomly out of 22 football players. What is the probability that the two best players are in one team?
6. How many different ways a TOTO ticket can be filled in? (bet 1, 2, or x on the outcome of each of 13 soccer matches)
7. How many different ways a LOTTO (lottery) ticket can be filled in? (5 numbers are chosen out of 1,2,...,90)
8. How many different parties in a group of  $n$  people can be formed? (any number of people can form a party)
9. What is the probability ( $p_k$ ) that in a group of  $k$  people there are at least two celebrating his/her birthday on the same day? Surprisingly,  $p_{23} \approx 0.5$  and  $p_{55} \approx 0.99$  (birthday paradox).
10. *Matching problem*: Suppose that each of  $n$  students brings a present to a party. The presents are mixed up and then each student randomly selects a present. What is the probability that none of the students

selects his/her own present? (Equivalent problem:  $n$  married couples are dancing:  $n$  man–woman pairs are formed randomly. What is the probability that none of the men selects his own wife?)

11. How many fair coins should be tossed so that the probability of having at least one head be more than 0.9?