



Ch6.6 Generating Permutations and Combinations

Generating Permutations

▼ Example 2

What is the next permutation in lexicographic order after 362541?

Solution: The last pair of integers a_j and a_{j+1} where $a_j < a_{j+1}$ is $a_3 = 2$ and $a_4 = 5$. The least integer to the right of 2 that is greater than 2 in the permutation is $a_5 = 4$. Hence, 4 is placed in the third position. Then the integers 2, 5, and 1 are placed in order in the last three positions, giving 125 as the last three positions of the permutation. Hence, the next permutation is 364125.

My Solution: The last permutation is 362514 by eye, it is clear that 362541 is the largest starting with "362", so the next permutation starts with "364", as 4 is the next smallest number after "36". 1, 2, and 5 are left, and 125 is the smallest form of the three numbers, so the next permutation is 364125.

Generating Combinations

▼ Example 5

Find the next larger 4-combination of the set {1, 2, 3, 4, 5, 6} after {1, 2, 5, 6}.

Solution: The last term among the terms a_i with $a_1 = 1$, $a_2 = 2$, $a_3 = 5$, and $a_4 = 6$ such that $a_i \neq 6 - 4 + i$ is $a_2 = 2$. To obtain the next larger 4-combination, increment a_2 by 1 to obtain $a_2 = 3$. Then set $a_3 = 3 + 1 = 4$ and $a_4 = 3 + 2 = 5$. Hence, the next larger 4-combination is {1, 3, 4, 5}.

My solution: It is clear that {1, 2, 5, 6} is the current largest set starting with {1, 2, x, x}, so the next largest 4-combination must start with {1, 3, x, x}, as 3 is the next largest number in the set after 1 and 2. After knowing the first two numbers, chooses the next two smallest number from the remaining set, which is 4 and 5 from {4, 5, 6}, putting them in order makes {1, 3, 4, 5} as the answer.