

Lecture 4-homework

6. Determine the inversion sequences of the following permutations of $\{1, 2, \dots, 8\}$:

(a) 35168274

We have:

i	1	2	3	4	5	6	7	8
a_i	2	4	0	4	0	0	1	0

7. Construct the permutations of $\{1, 2, \dots, 8\}$ whose inversion sequences are

(a) 2,5,5,0,2,1,1,0

Using algorithm1:

8

87

867

8657

48657

486573

4865723

48165723

15. For each of the following subsets of $\{X_7, X_6, \dots, X_1, X_0\}$, determine the subset that immediately follows it by using the base 2 arithmetic generating scheme:

(b) $\{X_7, X_5, X_3\}$

subset	$\{X_7, X_5, X_3\}$
Binary rep	10101000
Binary rep+1	10101001
Next subset	$\{X_7, X_5, X_3, X_0\}$

29. Determine the 7-subset of $\{1, 2, \dots, 15\}$ that immediately follows 1,2,4,6,8,14,15 in the lexicographic order. Then determine the 7-subset that immediately precedes 1,2,4,6,8,14,15.

In the lexicographic order the 7-subset that follows 1, 2, 4, 6, 8, 14, 15 is 1, 2, 4, 6, 9, 10, 11 and the 7-subset that precedes 1, 2, 4, 6, 8, 14, 15 is 1, 2, 4, 6, 8, 13, 15.

33. In which position does the subset 2489 occur in the lexicographic order of the 4-subsets of $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$?

The position of 2489 is calculated as follows:

From 1ABC to 24DE, there are $C(8,3)$ combinations for 1ABC; there are $C(6,2)$ choices for 23DE; and there are $C(5, 2)$ choices for 24DE and 2489 is the last one with the form 24DE. So the position of 2489 is $C(8,3)+C(6,2) +C(5,2)= 81$.