

ICPC Training Material : Data Structures, Algorithms and Theorems

3 Mathematics	2
3.1 Number Theory	2
3.2 Combinatorics	2

Contents

1 Data Structures	1
1.1 Elementary Data Structures	1
1.1.1 Array	1
1.1.2 Stack	1
1.1.3 Queue	2
1.1.4 Heap	2
1.1.5 Hash	2
1.1.6 Trees	2
1.2 Advanced Data Structures	2
1.2.1 Priority queues	2
1.2.2 Fenwick Tree	2
1.2.3 K-D Tree	2
1.2.4 Interval Tree	2
2 Algorithms	2
2.1 Sorting and Searching	2
2.1.1	2
2.2 String manipulation	2
2.2.1 Z Algorithm	2
2.3 Graph Algorithms	2
2.4 Geometrical Algorithms	2
2.5 Network Flow Algorithms	2

1 Data Structures

1.1 Elementary Data Structures

In Computer Science, in order to treat and store data, it first needs to be structured. Hence, multiple data structures were created : Array, Hash, Queue, Tree and multiple others.

1.1.1 Array

The array is the most used data structure. It consists on a collection of values, such as each value is identified by at least one index.

1	23	-2	7	0	22
---	----	----	---	---	----

Arrays are useful because they exploit the addressing logic of computers. Generally, the memory is a one-dimensionnal array of words, whose indices are the addresses.

1.1.2 Stack

The stack is a data structure