1. **Write a program that allocates array of 20 integers and initializes each element by its index multiplied by 5. Print the obtained array on the console.**
2. **Write a program that reads two arrays from the console and compares them element by element.**
3. **Write a program that compares two char arrays lexicographically (letter by letter).**
4. **Write a program that finds the maximal sequence of equal elements in an array.**

**Example: {2, 1, 1, 2, 3, 3, 2, 2, 2, 1} 🡪 {2, 2, 2}.**

1. **Write a program that finds the maximal increasing sequence in an array. Example:   
   {3, 2, 3, 4, 2, 2, 4}** 🡪 **{2, 3, 4}.**
2. **Write a program that reads two integer numbers N and K and an array of N elements from the console. Find in the array those K elements that have maximal sum.**
3. **Sorting an array means to arrange its elements in increasing order. Write a program to sort an array. Use the "selection sort" algorithm: Find the smallest element, move it at the first position, find the smallest from the rest, move it at the second position, etc.**
4. **Write a program that finds the sequence of maximal sum in given array. Example:**

**{2, 3, -6, -1, 2, -1, 6, 4, -8, 8} 🡪 {2, -1, 6, 4}**

**Can you do it with only one loop (with single scan through the elements of the array)?**

1. **Write a program that finds the most frequent number in an array. Example:**

**{4, 1, 1, 4, 2, 3, 4, 4, 1, 2, 4, 9, 3} 🡪 4 (5 times)**

1. **Write a program that finds in given array of integers a sequence of given sum S (if present). Example: {4, 3, 1, 4, 2, 5, 8}, S=11** 🡪 **{4, 2, 5}**
2. **Write a program that finds the index of given element in a sorted array of integers by using the** [**binary search**](http://en.wikipedia.org/wiki/Binary_search_algorithm) **algorithm (find it in Wikipedia).**
3. **Write a program that creates an array containing all letters from the alphabet (A-Z). Read a word from the console and print the index of each of its letters in the array.**
4. **\* Write a program that sorts an array of integers using the** [**merge sort**](http://en.wikipedia.org/wiki/Merge_sort) **algorithm (find it in Wikipedia).**
5. **Write a program that sorts an array of strings using the** [**quick sort**](http://en.wikipedia.org/wiki/Quicksort) **algorithm (find it in Wikipedia).**
6. **Write a program that finds all prime numbers in the range [1...10 000 000]. Use the** [**sieve of Eratosthenes**](http://en.wikipedia.org/wiki/Sieve_of_Eratosthenes) **algorithm (find it in Wikipedia).**
7. **\* We are given an array of integers and a number S. Write a program to find if there exists a subset of the elements of the array that has a sum S. Example:**

**arr={2, 1, 2, 4, 3, 5, 2, 6}, S=14 🡪 yes (1+2+5+6)**

1. **\* Write a program that reads three integer numbers N, K and S and an array of N elements from the console. Find in the array a subset of K elements that have sum S or indicate about its absence.**
2. **\* Write a program that reads an array of integers and removes from it a minimal number of elements in such way that the remaining array is sorted in increasing order. Print the remaining sorted array. Example:**

**{6, 1, 4, 3, 0, 3, 6, 4, 5} 🡪 {1, 3, 3, 4, 5}**

1. **\* Write a program that reads a number N and generates and prints all the permutations of the numbers [1 … N]. Example:**

**n = 3 🡪 {1, 2, 3}, {1, 3, 2}, {2, 1, 3}, {2, 3, 1}, {3, 1, 2}, {3, 2, 1}**

1. **Write a program that reads two numbers N and K and generates all the variations of K elements from the set [1..N]. Example:**

**N = 3, K = 2 🡪 {1, 1}, {1, 2}, {1, 3}, {2, 1}, {2, 2}, {2, 3}, {3, 1}, {3, 2}, {3, 3}**

1. **Write a program that reads two numbers N and K and generates all the combinations of K distinct elements from the set [1..N]. Example:**

**N = 5, K = 2 🡪 {1, 2}, {1, 3}, {1, 4}, {1, 5}, {2, 3}, {2, 4}, {2, 5}, {3, 4}, {3, 5}, {4, 5}**