Introduction to Software Engineering – laboratory no 1

In java, c++ or c# write programs being the solution of **two** from below presented problems.
For each solution you can receive 5 points.

1. Write a function that find a dominant in a sequence of integer numbers (represented as a table), e.g. dominant([1, 2, -1, 1, 2, 3, 1]) is equal to 1. If there are more numbers with the same frequency the first of them (in the table) should be reported as the result, e.g. dominant([1, 2, 1, 2, 3, 2, 3, 3]) is equal to 2.
2. Write a function that allows you to add long binary numbers, represented as strings. The sum of two numbers (also represented as String) is the function result. If any of parameters is not a binary number the function may rise an exception or return a specific string.
3. Write a function that checks correctness of a NIP (represented as string). If NIP is correct, function returns true, otherwise – function returns false. NIP consists of 10 numbers, separated with "-" (xxx-xxx-xx-xx), when the last 10th number is a control sum calculated according to the formula:
   - Multiply subsequent NIP numbers by weights: 6, 5, 7, 2, 3, 4, 5, 6, 7
   - Sum the results
   - Calculate the remainder of by the division by 11

   Example:

   NIP 123-456-32-18

										CK	SUM	MOD11
NIP	1	2	3	4	5	6	3	2	1	8		
weights	6	5	7	2	3	4	5	6	7			
1.	6	10	21	8	15	24	15	12	7			
2.											118	
3.										8		8

   .

4. Write a function which encrypts a given string s over the alphabet {a, b, c, d, e, f, …, z} using the formula:

   $$a_i = letter ((position(a_i) + position(a_{i+1})) \mod k)$$

   where:

   a_i – ith letter in *s*; n –length of s; $a_{n+1} = a_1$, k – number of letters in the alphabet

   position(letter) – sequence number of the letter in the alphabet

   letter(position) – letter being at the position in the alphabet

   Example: encrypt("abc") = "ced"