Martian DNA

Russia is known for its success in the field of space exploration. Recently Russian scientists analysed the samples of Martian soil, and found some strange molecule, which they believe can be some kind of DNA. Unlike the normal DNA, this molecula has two base elements instead of four. So the whole molecule can be described as string of zeroes and ones.

The scientists calculated the length of the molecule, it is n base elements. Now they want to determine its structure, i.e. find the string of ones and zeroes S, that encodes the elements of the DNA. In order to do it, they can make tests in a special DNA analyser. In each test they set a sequence of elements, encoded by string P, and the analyser checks if this sequence appears in the DNA, i.e. if the string P is a substring of S.

The sample is very small, so the scientists will be able to make only t tests. Help them to make correct tests to determine the structure of DNA.

Implementation details

You should implement one function (method):

- `string analyse(int n, int t)`. This function should make the tests using the library function (method) `make_test` and resolve the DNA.
  - `n`: length of DNA,
  - `t`: number of tests allowed.
  - function should return the resolved string `S` describing the DNA.

Library functions

- `make_test(string p)`. This function checks if the string P is a substring of S.
  - `p`: substring to test.
  - function returns `true` if P is a substring of S, `false` otherwise.

Example

The grader makes the following function call:

- `analyse(3, 7)`. The length of string S is 3, you are alllowed to make 7 tests.

The contestants programm makes the following function calls:

- `make_test("00")` returns `false`.
- `make_test("01")` returns `true`.

- `make_test("10")` returns `true`.
- `make_test("11")` returns `false`.
- `make_test("010")` returns `false`.

Now the only possible string is `"101"`, so the function `analyse` returns `"101"`.

Subtasks

1. (11 points) $n \leq 5, t = 31$,
2. (25 points) $n \leq 100, t = 256$,
3. (64 points) $n \leq 1000, t = 1024$.

Sample Grader

The sample grader reads the input in the following format:

- line 1: string S,
- line 2: integer t.

Language Notes

Please use the provided template files for details of implementation in your programming language.