

Advanced Coding Practice

Coding Problem #1

2023 Fall, CSE4152
Sogang University



Finding Celebrities

A celebrity is defined as a person who is known by everybody but does not know anyone. How can you find any celebrities among N people?

You can freely ask anyone as follows: "Hey, you know Mr. (or Ms.) X?"

Suppose that there are N people. Design a method that

- a) determines whether there is some celebrities among the people
- b) if there is any celebrities, find them efficiently (minimizing the number of questions you make).

Finding Celebrities

Three code files are given: `main.cpp`, `party.cpp`, `solve.cpp`. The “Party” object has three functions.

- `setRandomCase()`: generates a random case for the relations among people.
- `askAToKnowB(A, B)`: check whether A knows B. If true, 1. Otherwise, 0.
- `answer(x)`: check whether x is a celebrity or not. It should be called only once.

Your task is to implement function “solve” in “`solve.cpp`” that returns the celebrity. If there is no one, feed function `answer()` with -1.

Minimum calculation

Imagine an electric calculator which has only two arithmetic operations, i.e., assignment operation($:=$) and multiplication operation (\times). We want to let this machine compute $b = a^n$ for given numbers a and n . Design a method that produce a code for this machine, minimizing the number of multiplications.

Minimum calculation

Input

16

Output

4 1 2 4 8 16