

**BHT SOFTWARE ENGINEER CODING TEST**

This test task is part of our initial stage of hiring software engineers. It helps us evaluate your coding skills and maturity.

Instructions:

1. The screening test has **3 programming questions** and **1 SQL question**. Attempt all **4** questions.
2. Use any programming language you are comfortable with.
3. Each question should be written on a separate file.
4. Read and understand each question carefully before attempting it.
5. You have up to **120 minutes** to submit this test. **You can only submit once.**
6. For each question you attempt, please ensure that it handles all possible cases and handles large inputs efficiently.
7. Once you are finished, submit your code in a .zipped folder to [hr@bht-mw.org](mailto:hr@bht-mw.org).
8. Plagiarism is strongly prohibited.

Good luck!

**Problem 1.**

You are given an integer **N**, followed by **N** lines of input (1 <= **N** <= 100). Each line of input contains one or several words separated with single spaces. Each word is a sequence of letters of English alphabet containing between 1 and 10 characters, inclusive. The total number of words in the input is between 1 and 100, inclusive.

Your task is to reverse the order of words in each line of input, while preserving the words themselves. The lines of your output should not have any trailing or leading spaces.

**Example**

|  |  |
| --- | --- |
| ***Input*** | ***Output*** |
| 3  Hello World  Bye World  Useless World | *output*  World Hello  World Bye  World Useless |
| *5*  *negotiate with reason*  *a quick brown fox*  *this is a random sentance*  *this is not so random a sentance*  *ok bye* | *reason with negotiate*  *fox brown quick a*  *sentance random a is this*  *sentance a random so not is this*  *bye ok* |

**Problem 2**

A Fibonacci-like sequence is a sequence of integers **a**1, **a**2, ... for which **a**n = **a**n-1+**a**n-2 for all **n** > 2. You are given the first two elements of the sequence **a**1 and **a**2, and the 1-based index **n**. Output the **n**-th element of the sequence.

The input data consists of a single line which contains integers **a**1, **a**2 and **n** separated by single spaces. 0 < **a**1, **a**2, **n** < 10.

**Example**

|  |  |
| --- | --- |
| *Input* | *Output* |
| 1 2 3 | *3* |
| *10 10 10* | *550* |

**Problem 3**

To see if a number is divisible by 3, you need to add up the digits of its decimal notation, and check if the sum is divisible by 3.

To see if a number is divisible by 11, you need to split its decimal notation into pairs of digits (starting from the right end), add up corresponding numbers and check if the sum is divisible by 11.

For any prime **p** (except for 2 and 5) there exists an integer **r** such that a similar divisibility test exists: to check if a number is divisible by **p**, you need to split its decimal notation into **r**-tuples of digits (starting from the right end), add up these **r**-tuples and check whether their sum is divisible by **p**.

Given a prime int **p**, find the minimal **r** for which such divisibility test is valid and output it.

The input consists of a single integer **p** - a prime between 3 and 999983, inclusive, not equal to 5.

**Example**

|  |  |
| --- | --- |
| *Input* | *Output* |
| *3* | *1* |
| *11* | *2* |
| *7* | *6* |

Problem 4.

Please use the provided **dump.sql** script to set up your database. We recommend using mysql as we will be evaluating your solution against a mysql database but you are free to develop your queries on any platform.

Create a summary report for Long Rains Season 2011. This report should show for the Long Rains Season of 2011 how many clients and groups there are, together with their combined land sizes in each district, sector, and site. A district has several sectors, made up out of sites, with each site made up out of several groups of farmers.The land size of a client for an input is recorded together with their input choice (e.g. WS 505 Maize seed).

Take note:

* There is only one district in the provided data.
* Some clients are dropped, i.e. no longer active. These clients should be excluded from your calculations.
* We also have 'add-on' products like solar lights. The lands for these add-ons is recorded as -1 but this should not be included in land size calculations.

Your task is to:

Write a `SELECT` statement to generate the report by site for Long Rains 2011. Include **District**, **Season**, **Sector**, **Site**, **GroupCount**, **ClientCount**, and **TotalLandSize**. You should order alphabetically by Sector and then by Site. Save your SQL in a file with a ‘.sql’ extension.