



## REGULATIONS

**Due date:** 23:59, 7 December 2016, Wednesday (*Not subject to postpone*)

**Submission:** Electronically. You should save your program source code as a text file named `the2.py` and submit it to us via the course's COW page.

**Team:** There is **no** teaming up. This is an EXAM.

**Cheating:** Source(s) and Receiver(s) will receive zero and be subject to disciplinary action.

## INTRODUCTION

A *check digit*<sup>1</sup> is a form of redundancy check used for error detection on identification numbers, such as bank account numbers, which are used in an application where they will at least sometimes be input manually. It consists of one or more digits computed by an algorithm from the other digits (or letters) in the sequence input.

With a check digit, one can detect simple errors in the input of a series of characters (usually digits) such as a single mistyped digit or some permutations of two successive digits.

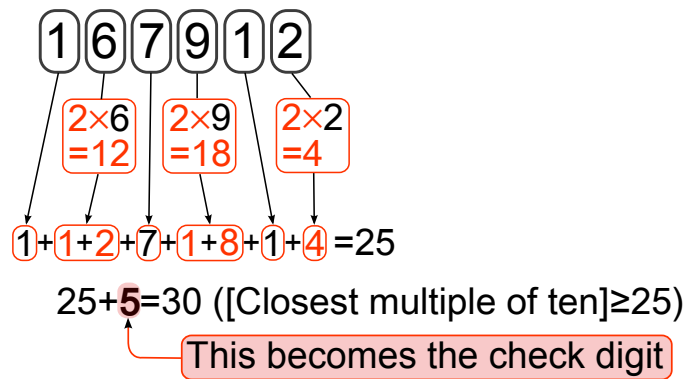
Our university implements also a check digit algorithm for student numbers. A student number has exactly six digits. The Algorithm is as follows:

- $sum \leftarrow 0$
- For each digit in the student number that has an odd position (first, third, fifth) take the digit and add it to the *sum*.
- For each digit in the student number that has an even position (second, forth, sixth) take twice the digit. If this result of doubling is a two digit number then add each of these digits to the *sum*, otherwise add the result of the doubling (which is a single digit number itself) to the *sum*.
- The one digit number, which when added to the *sum* results in a multiple of 10, is the check digit

Take as example the student number of 167912

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<sup>1</sup>From Wikipedia definition of 'check digit'



The check digit of the student number 167912 is found to be 5. As you all well know, this is written as 167912-5. That is called the *student-id*.

## PROBLEM & SPECIFICATIONS

Your mission, should you choose to accept it, is to determine the digit that is missing from a METU student-id or if no digit is missing to determine whether it is valid or not. A student-id will be read from the standard input as

#####-#

where each # is a decimal digit or a '?' (question mark). There will be at most one question mark. It is also possible that no question mark appears in the input. You will be printing a single line of output which strictly follows the below given specification:

- **There is no question mark:** Print **VALID** if the check digit is correct. Otherwise print **INVALID**.
- **Check digit position is question marked:** Compute the check digit and print the whole student-id (with the correct check digit present).
- **One of the first six digit position is question marked:** Compute the digit position that is question marked and print the whole student-id (with the correct digit present).

## FIVE EXAMPLE RUNS

```
>>> 167912-5
VALID
```

```
>>> 167912-?
167912-5
```

```
>>> 1679?2-5
167912-5
```

```
>>> 1679?2-5
167912-5
```

```
>>> 13?503-7
139503-7
```

# GRADING

Comply with the specifications. Do not try to beautify neither the input nor the output. Your program will be graded through an automated process.

Your program will be tested with multiple data (a distinct run for each data). Any program that performs only 30% and below will enter a glass-box test (eye inspection by the grader TA). The TA will judge an overall THE2 grade in the range of  $[0,30]$ . A program based on randomness will be graded zero. The glass-box test grade is not open to discussion nor explanation.