

Homework1: Perpetual calendar

Description

It is well known that [ShanghaiTech University](#) is a place full of geeks and nerds. Bored with using traditional calendars, which are based on astronomy and agriculture, like the [Gregorian calendar](#), they want to design a new calendar with ShanghaiTech characteristics called the ShanghaiTech calendar.

ShanghaiTech Calendar

Overview

The ShanghaiTech calendar is a year, month and date frame.

Date

The coding system of dates is a hexadecimal system. The characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. The first day is Day 1, and the second day is Day 2, and so on.

Week

Same as those in the Gregorian calendar, days in the ShanghaiTech calendar are grouped into 7-day weeks.

- Sunday
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday

Month

A month usually contains 60, 61 or 62 days. The exact number of days of a certain month is

$$D = 60 + (10Y - M) \bmod 3$$

where

- D is the number of days
- Y is the year
- M is the month

There are 6 months a year:

- Sist
- Spst
- Slst
- Sem
- Siais
- lhuman

and when calculating, we let (Sist = 1, Spst = 2, ... , lhuman = 6)

Year

A year is a leap year if it satisfies

$$[Y + S(Y)] \bmod 13 = 0$$

where

- Y is the year
- S(x) means the [digit sum](#) of x

A leap year has 7 months, the extra one called the leap month, which satisfies

$$M = [Y - S(Y)] \bmod 6 + 1$$

where

- M is the leap month
- Y is the year

- $S(x)$ means the [digit sum](#) of x

It means the leap month immediately follows Month M and it is the same as Month M only with its name capitalized.

For example, Year 1236, $(1236 + 1 + 2 + 3 + 6) \bmod 13 = 0$, so it is a leap year; $(1236 - 1 - 2 - 3 - 6) \bmod 6 + 1 = 1$, so Year 1236 has 7 month: Sist, SIST, Spst, Slst, Sem, Siais and Ihuman.

NOTES:

- Jan 1 of the Gregorian calendar Year 1 is Sist 1 of the ShanghaiTech calendar Year 1.
- Leap years of the Gregorian calendar
 - years divisible by 4000 are **NOT** leap years,
 - years divisible by 400 but not by 4000 **ARE** leap years,
 - years divisible by 100 but not by 400 are **NOT** leap years,
 - years divisible by 4 but not by 100 **ARE** leap years,
 - years not divisible by 4 are **NOT** leap years.

Input

`./calendar [[month] year][[date]]`

NOTES:

- year and month are both integers.
- data is represented by a [Regular Expression](#):

Gregorian Calendar

`[Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec]\s((0?[1-9])|((1|2)[0-9])|30|31),\s[0-9]{1,4}`

ShanghaiTech Calendar

`[Sist|SIST|Spst|SPST|Slst|SLST|Sem|SEM|Siais|SIAIS|Ihuman|IHUMAN]\s((0?[1-9A-F])|((1-3)[0-9A-F])),\s[0-9]{1,4}`

- All inputs are valid.
- All dates range from Jan 1, 1 to Dec 12, 9999.
- You may use `int main(int argc, char const *argv[])` to achieve the input.

Output

Input format	Function	Output format
<code>./calendar year</code>	Show the Gregorian calendar of the year	template
<code>./calendar month year</code>	Show the Gregorian calendar of the month	template
<code>./calendar date</code>	Convert the date of one calendar to the other	Only a line, containing the date in the other calendar.

NOTES:

The templates contain output formats of the yearly calendar and the monthly one. You may only replace crosses with numbers and spaces. If a number has only one digit, print a space before the digit instead of a "0".

Sample

Sample input	Sample output
./calendar 2005	output
./calendar 6 1989	output
./calendar Jan 1, 123	output
./calendar SIST 2D, 1236	output

Time Limit

1s