Mission - Date Calculator

Background:

Mr Zhou was born on 15 Apr 1984. He came to Singapore on 26 Oct 2000 to study when he was 16 years old. In year 2016, he turned 32. It is interesting that he has spent ~16 years in China and ~16 years in Singapore.

Mr Zhou wants to find out the date on which he would have spent equal number of days in the two countries so that he can have a personal celebration for himself!

He needs your help to write a simple program that can help him answer the following questions:

1. How many days did Mr Zhou spend in China before coming to Singapore in the year 2000?

2. Assuming that the days where Mr Zhou went travelling for holiday are negligible, on which date can he hold the celebration for himself to have lived exactly the same number of days in both countries? Which weekday would that be?

To accomplish this noble quest, you are to complete the following tasks and build a Date Calculator for him.

Important Notes:

1. All dates should be strings following the format "`DDMMYYYY`".
2. All dates entered are later than 01 Jan 1900.
3. Test cases are given in the template, but you are always encouraged to design your own test cases to test your functions thoroughly.

Task 1 – Helper Functions (7 Marks)

In order to build a Date Calculator, we need to construct a few helper functions.

1a Check leap year (1 Mark)

Function `is_leap_year`, takes in a `year`. It returns `True` if the year is a leap year, and `False` otherwise.

1b Find number of days in a month (1 Mark)

Function `days_in_month`, takes in a month and returns the number of days in that month for a normal year (365 days). This function need **not** to consider leap year cases.

1c Calculate number of leap years between 2 years (Iterative) (2 Marks)

Function `num_of_leap_years`, takes in a `start_year` and an `end_year`. It calculates and returns the number of leap years in between these two years.

Note:
1. When calculating the number of leap years, please include the `start_year` and exclude the `end_year`.
2. `end_year` will not be a year which is earlier than `start_year`.

1d Date Validation (1 Mark)

Function `is_valid_date`, it checks if the date entered is valid and if it exists in real life.

Task 2 – Main Functions (11 Marks)

2a Calculate number of days from 01 Jan 1900 (4 Marks)

In order to make the calculation easier, 01 Jan 1900 will be used as a beginning reference point for all calculation of dates.
Write a function `num_of_days_from_1900` which takes in a date and calculates the number of days of this input date from 01 Jan 1900.

2b Calculate number of days between two dates (1 Mark)

Function `days_between_2_dates`, takes in 2 dates and returns the number of days between the 2 dates.

2c Find the date which occurs n days after 01 Jan 1900 (4 Marks)

Function `add_n_days_after_1900`, takes in a specific number of days and adds it to 01 Jan 1900, then returns the new date following the format of `DDMMYYYY`.

2d Find the date which occurs n days after a specific date (1 Mark)

Function `add_n_days_from_a_date`, takes in a date and a specific number of days, adds the number of days to the input date, then returns the new date following the format of DDMMYYYY.

2e Find the weekday of a specific date (1 Mark)

Function `weekday_of_date`, takes in a date and returns the weekday which the date is on.
It is given that 01 Jan 1900 is a Monday.

Task 3 – Date Calculator! (2 Marks)

Complete the function `date_calculator` so that users can make use of this simple interface to select different options to perform simple calculations with dates.

Congratulations!

You have just implemented your own Date Calculator!