CS111 Homework 4 (Due Nov 8, 2018)

Name your program **hw4.cpp**. Program must be able to compile or you will get at most 1 out of 2 points for the assignment.

Write **one single** complete C++ program to do all sections below:

Run the following command in venus to copy the starter code:

```
cp ~ctse/cs111/hw4.cpp ~/hwSubmission/
```

Part A: (Absolute C++ textbook ch.3 question 12)

Which Day Was It?

Write a program that inputs a date (e.g. July 4, 2008) and outputs the day of the week that corresponds to that date. The following algorithm is from http://en.wikipedia.org/wiki/Calculating_the_day_of_the_week. The implementation will require several functions:

```
bool isLeapYear(int year);
```

This function should return `true` if `year` is a leap year and `false` if it is not. Here is pseudocode to determine a leap year:

leap_year = ((year divisible by 400) or (year divisible by 4 and year not divisible by 100))

```
int getCenturyValue(int year);
```

This function should take the first two digits of the year (i.e. the century), divide by 4, and save the remainder. Subtract the remainder from 3 and return this value multiplied by 2. For example, the year 2008 becomes: (20/4) = 5 remainder 0. 3 – 0 = 3. Return 3 * 2 = 6.

```
int getYearValue(int year);
```

This function computes a value based on the years since the beginning of the century. First, extract the last two digits of the year. For example, 08 is extracted for 2008. Next, factor in leap years. Divide the value from the previous step by 4 and discard the remainder. Add the two results together and return this value. For example, from 2008 we extract 08. Then (8/4) = 2 remainder 0. Return 2 + 8 = 10.

```
int getMonthValue(int month, int year);
```

This function should return a value based on the table below and will require invoking the `isLeapYear` function:

Month	Return Value
January	0 (6 if `year` is a leap year)
February	3 (2 if `year` is a leap year)
March	3
April	6
May	1
June	4
July	6
August	2
September	5
October	0
November	3
December	5

Finally, to compute the day of the week, compute the sum of the date's day plus the values returned by `getMonthValue`, `getYearValue`, and `getCenturyValue`. Divide the sum by 7 and compute the remainder. A remainder of 0 corresponds to Sunday, 1 corresponds to Monday, etc. up to 6 which corresponds to Saturday. For example, the date July 4, 2008 should be computed as (day of month) + (`getMonthValue`) + (`getYearValue`) + (`getCenturyValue`) = 4 + 6 + 10 + 6 = 26. 26/7 = 3 remainder 5. The fifth day of the week corresponds to Friday.
Your program should allow the user to enter any date and output the corresponding day of the week in English.

Part B: (Absolute C++ textbook ch.4 question 2)
The area of an arbitrary triangle can be computed using the formula

$$Area = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$$

where a, b, and c are the lengths of the sides, and s is the semi-perimeter:

s = (a + b + c) / 2

Write **a void function** that uses five parameters: **three value parameters** that provide the lengths of the edges and **two reference parameters** that compute the area and perimeter (not the semi-perimeter). Make your function robust. Note that not all combinations of a, b, and c produce a triangle. Your function should produce correct results for legal data and reasonable results for illegal combinations.

Note: It is necessary to test whether edges of lengths a, b and c actually form a triangle. The test for values of `a`, `b` and `c` to form a triangle is that *each* of the following inequalities be satisfied.

```
a + b > c
```

and

```
b + c > a
```

and

```
a + c > b
```

Sample run with input values entered by a user shown in red:

```
[ctse@venus ans]$ ./hw4_fa18_sol
Part A:
Enter month (1-12): 10
10
Enter day (1-31): 27
27
Enter year (0000-9999): 2018
2018
10/27/2018 is a Saturday

Part B:
Please provide the lengths of the edges of a triangle: 1 4 3
1 4 3
The input values cannot form a triangle. Bye!!
```

Second example:

```
[ctse@venus ans]$ ./hw4_fa18_sol
Part A:
Enter month (1-12): 10
10
Enter day (1-31): 29
29
Enter year (0000-9999): 2018
2018
10/29/2018 is a Monday

Part B:
Please provide the lengths of the edges of a triangle: 3 4 6
3 4 6
Area of triangle = 5.33268
Perimeter of triangle = 13
```

Third example:

```
[ctse@venus ans]$ ./hw4_fa18_sol
Part A:
Enter month (1-12): 1
1
Enter day (1-31): 1
1
Enter year (0000-9999): 2000
2000
1/1/2000 is a Saturday

Part B:
Please provide the lengths of the edges of a triangle: 3 4 5
3 4 5
Area of triangle = 6
Perimeter of triangle = 12
```