CS150 Assignment 3
Car Rental Invoice Calculator

Date assigned: Friday, September 30, 2016
Part 1 due: Wednesday, October 5, 2016, 1 pm (25 points)
Part 2 due: Monday, October 17, 2016, 1 pm (25 points)

This is an individual assignment

Goals:

• Loops
• running sums
• formatted output

You have been asked by a car rental company to write a program to create invoices for customers.

Your program is to ask the user for the month, the year, the current day of the month, the weekday rate, the weekend rate, and the number of days the customer will be renting the car. You will then output an invoice showing the date (day of month), day of the week, charge for that day, and a running sum. After the table you are to display the total cost.

Some things to note:

1. Assume that the user enters only valid values.
2. Use setw to format the table as shown in the sample output. Hint: Each column is 14 characters wide.
3. In the table, always display a blank line after Saturday.
4. All monetary amounts must be displayed to 2 decimal places.
5. There must be no magic constants in your program.
6. Note that a client could rent a car and that car rental could span different months or different years.
Determining if a year is a leap year
You must determine if the year is a leap year so that you can provide a correct information for the month of February. A year is a leap year if it is divisible by 4. The only exception to this is if it is a century year. Then it is a leap year only if it is divisible by 400.

Determining the day of the week of a particular date:
To calculate the day on which a particular date falls, the following algorithm must be used:

\[
a = \frac{(14 \cdot \text{month})}{12} \\
y = \text{year} - a \\
m = \text{month} + 12 \cdot a - 2 \\
dayOfWeek = (\text{day} + y + y/4 - y/100 + y/400 + (31*m)/12) \mod 7
\]

where \text{year} is the four-digit year, \text{month} is the integer between 1 and 12, \text{day} is the day of the month, and \text{dayOfWeek} is the day of the week. The value for \text{dayOfWeek} is 0 for Sunday, 1 for Monday, 2 for Tuesday, etc. All variables must be integers!

For example, if you were trying to find the day of the week on which 9/28/2016 falls, then you would substitute:

- 9 for \text{month}
- 28 for \text{day}
- 2016 for \text{year}

The result in \text{dayOfWeek} will be 3, which is a Wednesday.

Part 1 (Due 10/5): Name the project (03_A_CarRentalCalculator)

For part 1, you must turn in a program that displays if a year is a leap year or not, the number of days in the entered month, and the day of the week for the day the user entered.

Sample output for part 1:

```
*******************************
Car Rental Calculator
*******************************
What is the month? 9
What is the year? 2016
What is the day of the month? 1

2016 is a leap year.
The number of days in 9/2016 is: 30
9/1/2016 is a Thursday.
Press any key to continue . . .
```
Part 2 (Due 10/17): Name the project (03_B_CarRentalCalculator)

Submit the complete program as described on page 1.

NOTES:

- You must follow the coding standards presented in class and provided on the class website.
- In the above formulas, the following numbers are meaningful and must be declared as const with meaningful names: 4, 7, 14, 31, 100, 400.
- The names of the days of the week must be const strings.
- The positions of the days of the week, 0-6, Sunday-Saturday, must be const.
- You will find other constants that need to be const as you code.
- If you complete part 1 before 10/5, you can start working on part 2.

To complete this assignment you must submit the following:

1. An electronic copy of your program on grace
   a. Add new projects named 03_A_CarRentalCalculator and 03_B_CarRentalCalculator to your previously created assignment solution called PUNetIDAssignments. It is vital that you name your project correctly!
   b. Type your program (fully documented/commented) into the project. The comment block at the top of the program needs to contain your name, the date the assignment is due, the class name, assignment number and name, and a brief description of the program.
   c. Pay attention to the example output! Your program’s output must look exactly like the example output! The spacing and newlines in your output must match exactly.
   d. Your program must use if statements, logical operators, constants, switch statements, and a while loop.
   e. Make sure that your program compiles and runs correctly. If you get any errors (or warnings), double check that you typed everything correctly. Be aware that C++ is case-sensitive.
   f. Once you are sure that the program works correctly it is time to submit your program. You do this by logging on to grace and placing your complete solution folder in the CS150-01 Drop folder. This solution folder must contain four projects we have done this semester.
   g. The program must be in the drop folder by 1pm on the day that it is due. Anything submitted after that will be considered late.

2. A hard copy of your program
   a. The hard copy must be placed on the instructor’s desk by 1pm on the day that it is due.
   b. The hard copy must be printed in color, double-sided, and stapled in the upper-left corner if necessary. I do not bring a stapler to class.

Good luck! And remember, if you have any problems, come and see straight away.

The printers in Marsh are slow. Do NOT expect to be able to print your code 10 minutes before class!