Csci 41 Intro. to Data Structures
Lab 1: C++ Reviews and Ch1

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Assigned: January 22, 2019
Deadline: **Please submit your work at the end of this lab**.
If you cannot finish this lab exercise, please continue to work on the lab exercise. Submit your final version again before beginning of next lab.

Directions:

1. [up to 5 mins] Read the descriptions of lab exercise.
2. [up to 25 mins] Discuss algorithms and coding of the lab exercise may be with teammates
3. [up to 1 hr] Code your lab exercise individually. You may ask for help from teammates or TA. But try to limit it unless you really get stuck.
4. [up to 30 mins] Review source code your teammates. Try to identify defects of your teammates. Return back the source code to teammates. Fix the defects that pointed out by your teammates.
5. [up to 1 mins] **You must** upload a single zip file (e.g., YourLastName-Lab1.zip) to blackboard. The file should contain the following:
   a. All *.cpp and *h files, if any
   b. For each function or algorithm of your source code, you are requested to explain/comment the concepts/philosophy/theories of the function/algorithm. IF YOU DON'T HAVE DETAILED ENOUGH EXPLINATION FOR EACH FUNCTION/ALGORITHM YOU WILL GET 10 PTS OFF).
6. If you cannot finish this lab exercise, please continue to finish before next lab.

Please DO NOT submit the entire Visual Studio projects to me (**DO NOT SUBMIT EXE FILE TO ME. DO NOT SUBMIT PROJECT FILE TO ME**).

For this exercise, you are to introduce a program that shows a *menu* of functions/activities that you want user to choose from. The menu will continue to ask for which function to invoke until inputting -1.

1. The 1st function will request user to type in a number - year. Then the function will return true if it is a leap year (https://en.wikipedia.org/wiki/Leap_year). The function will return false if it is not a leap year.
2. The 2nd function will request user to type in a number – year. Then the function will return a string that tells user which Chinese Zodiac year it is. (https://en.wikipedia.org/wiki/Chinese_zodiac). You don't need to be precise to dates, as in Wiki page. Use year as measurement unit is good enough.
3. The 3rd function will return the minimum value of an integer vector (e.g., int findMin(vector<int> arr)

4. The 4th function will process a string in the format of left operand operator right operand. It will return the computational result of the converted string. For example:
    - calculate("54321+222") will return 54543
    - calculate("120*20") will return 2400
    - calculate("235/3") will return 78
    - calculate("356-32") will return 324

5. The 5th function will compute the average of a 2 dimensional vector. (please introduce a 2D vector, where # row != # column.
6. Please make sure you test all functions.