CISC 1600—Computer Science I
Spring, 2015

Programming Project #4: How Old Are You Really?
Date Due: Thursday 7 May 2015

Objective: To show our understanding of functions and specifically how arguments are passed to functions (i.e., pass by value, pass by reference, pass by constant reference.) To further our understanding of loops, their logic and the correct use of the `while()`, `do...while()`, and `for()` control structueres. in the C++ programming language; specifically to show an understanding of the logically appropriate use of nested loops and embedded conditional statements. To reinforce our understanding of data types and variables; namely, how to create, initialize, display and perform basic arithmetic operations on those variables.

The assignment is to write a program that calculates the difference between two dates, this difference being expressed in terms of years, months, and days.

Your program should prompt the user to enter the current date in the usual form `mm/dd/yyyy`. After the date entered has been validated (as specified below), the program should prompt the user to see if they want to calculate how old they are. If she accepts, the program should prompt the user to enter the date of her birth, also in the usual form `mm/dd/yyyy`. Not only must this date be validated, but it also has to be a date in the past (prior to the current date entered). Assuming both days have been correctly validated, the program should then display the persons age in years, months, and days.

You should use

```
struct Date {
    int month;
    int day;
    int year;
};
```

to represent dates.

Your program should be designed around the following C++ functions:

- `get_date()` should return a valid date from standard input. It should return a `Date` as its result.

- `get_birth_date()` should return a valid birth date from standard input. It should return a `Date` as its result.

- `print_date()` should print a `Date`.

- `int days_in_month(int month)` should return the number of days in `month`, the latter being an integer in the range $\{1, 2, \ldots, 12\}$.

- `bool is_valid_date(const Date& date)` should return `true` or `false`, depending on whether `date` is really a valid date. This means the following:

    - The month should be an integer in the range $\{1, 2, \ldots, 12\}$.

    - The day must be valid day for the given month. If you don't remember how many days are in each month, Google for same. For this assignment, you can ignore leap years, i.e., February always has 28 days.

    - `bool is_before(const Date& date1, const Date& date2)` returns `true` if either the two dates are equal or if the first date precedes the second date, i.e., if $date1 \leq date2$.

    - `calculate_age()` calculates the difference between two dates, said difference being given in terms of years, months, and days. Note that if you simply subtract the fields in the two dates, you might get a negative number. For example, if $days < 0$, you should decrement `months` and add the number of days in a month to `days`. For this particular function, simply assume that there are 30 days in a month.

To give you some experience in figuring out parameter passing mechanisms, I have not given the parameter lists for all these funtions. See if you can figure these out on your own.

Here are some sample runs:

```
agw@cis-mac:proj4$ proj4
Welcome to Age Calculator!
Please enter today's date (mm/dd/yyyy): 04/22/2015
Date entered was 4/22/2015
Would you like to see how old you are (y/n)? n
You are so chicken!
agw@cis-mac:proj4$ proj4
Welcome to Age Calculator!
Please enter today's date (mm/dd/yyyy): 04/22/2015
Date entered was 4/22/2015
Would you like to see how old you are (y/n)? y
Please enter your birth_date (mm/dd/yyyy): 12/22/1950
Your birthday is 12/22/1950
You are 64 years, 4 months, and 0 days old.
agw@cis-mac:proj4$ proj4
Welcome to Age Calculator!
Please enter today's date (mm/dd/yyyy): 04/22/2015
Date entered was 4/22/2015
Would you like to see how old you are (y/n)? y
Please enter your birth_date (mm/dd/yyyy): 12/25/1950
Your birthday is 12/25/1950
You are 64 years, 3 months, and 27 days old.
```

The project's share directory ˜agw/class/cs1/share/proj4 only one item, an executable proj4-agw that you should copy to your working directory.

Deliverables: A clean typescript, containing the following commands, along with their output:

```
cat proj4.cc
g++ -o proj4 proj4.cc -std=c++11
proj4
proj4-agw
proj4
proj4-agw
.
.
.
```

The idea here is that you should use the same dates each time you run proj4 and proj4-agw. The results should agree. (For that matter, the input/output should also agree, if you want full credit under that rubbric.) Do as many executions of proj4 as needed to convince yourself (and me) that the program runs correctly. One of these should include a refusal to find out your age (as in the first run of proj4 above).

Once again, see previous project handouts if you're still unclear about photo, as well as the relevant entry in the Departmental online help document, found at

<div align="center">http://www.dsm.fordham.edu/help</div>

You should send the clean typescript to me via email, something like

```
mail -s "Project 4" -r bovik@cs.cmu.edu agw < proj4.out
```

Please don't use Dr. Harry Q. Bovik's email as your return address!

Good luck!