Background

The Blue Ridge Gourmet Spirits company is very pleased with the applications that you created and now they want a major enhancement.

You are asked to combine all computations into one application. This new application must present the user with a menu of choices so that they can select the desired output ($S_1$, $S_2$, or $V$) instead of invoking separate programs.

Additionally, the Vice President of Software Engineering says that it is likely you will be promoted after delivering this project. Therefore, it is critical that you include detailed comments in the source code to ensure that your replacement can maintain the application.

There are no changes to the mug design specifications. Below are the key formulas used previously. Refer to Project #1 for any additional details.

\[
S_1 = 2\pi r_m (h_m + r_m)
\]

\[
S_2 = 2\pi r_m h_m
\]

\[
V = \pi (r_m)^2 h_m
\]

(Note $S_1$ includes the area of the base and top whereas $S_2$ does not. These quantities will provide the design team with a rough estimate of the upper and lower bounds on the amount of glass necessary to produce the mugs).

Programming Skills

The programming skills, in addition to those from the previous project, required to complete this assignment include:

- User interface design and implementation
- Error Control
  - Identifying user input errors
  - Appropriately responding to errors
- Control Structures
  - Repetition
  - Selection
Requirements

Your job is to consolidate the three separate programs from Project #1 into a single program. This new application must present the user with a list of options. Depending on which option the user selects, the application will compute and display the appropriate computation ($S_1$, $S_2$, or $V$).

Once the requested information has been output to the screen, the application will again present the user with the same menu of options. This process shall repeat until the user selects the option to exit the program.

Below is an example of how the menu might look.

You are not required to include the optional or extra credit menu items. All other items must appear in your menu, and the letters corresponding to the user's selection must be exactly the same as above. After one of the menu options (other than Exit) is selected, the application shall prompt the user to enter the logo dimensions. Next, the application shall make the necessary calculations and display the requested output on the terminal screen. Finally, the application shall again present the menu of options to the user.
Below is an example of how this might look (note that the lines showing the user's input of logo dimensions have scrolled off screen and are no longer visible in this screen capture).

![Image of a computer screen showing a menu for mug design computations]

Error control is a critical component of this application. In particular, incorrect input from the user can have disastrous results. Examples of user input error include:

- Entering a character that does not correspond to a valid menu option
- Entering extra characters at the menu prompt
- Entering a character instead of a number for either of the logo dimensions

Your application must check for these and any other potential errors and respond appropriately.
Extra Credit

For 5 points extra credit, include a menu option that will output all three computations. (If you included the extra credit computation for $S_{1b}$ in your last project, you may include that in Project #2 as well; however, no extra credit will be added).

Due Date

This assignment is due on Monday, February 13, 2012 at no later than 11:59 pm. In general, requests for additional time will not be considered. Early submissions are encouraged. Late penalties will be assessed as stated in the course syllabus.

What To Submit

You must submit one .cpp file that is your source code for this project.

File Naming

Please name your file as follows:

<netID>P2.cpp

Note that you must replace <netID> with your actual netID. Do not include the angle brackets in your file names (e.g. waw23P2.cpp).

Academic Integrity

This is an individual project and all work must be your own. No documentation of references is required for this project. Otherwise, you must follow all guidelines specified in the Academic Honesty section of this course syllabus.
Grading

This graded assignment is worth 100 points and will be counted as part of the Programming Projects category for the course. Points are allocated as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Control</td>
<td>30</td>
</tr>
<tr>
<td>User Interface</td>
<td>15</td>
</tr>
<tr>
<td>Code quality, accurate computations</td>
<td>15</td>
</tr>
<tr>
<td>Output quality</td>
<td>15</td>
</tr>
<tr>
<td>Comments</td>
<td>15</td>
</tr>
<tr>
<td>File naming conventions are followed exactly</td>
<td>5</td>
</tr>
<tr>
<td>Correct file, in correct format, is posted to Blackboard</td>
<td>5</td>
</tr>
</tbody>
</table>

Include the following comments at the start of your program:

```
/*****************************/
*                          *
*  <FileName>.cpp           *
*                          *
*  COSC 051 Spring 2012    *
*  Project #2              *
*                          *
*  Due on:                 FEB 13, 2012 *
*  Created on:             MMM DD, 2012 *
*  Last edited on:         MMM DD, 2012 *
*  Author: <your name>     *
*  netID: <your netID>     *
*                          *
*  *****************************/
```