Assignment #4 - Functions, random number generation

Due: NEW DEADLINE MONDAY OCTOBER 22nd 11:59:00PM
Friday October 19th, 11:59:00pm

Objective

This assignment will consist of writing a couple functions and allowing the student to gain practice and understanding of random number generation, and general coding skills dealing with functions, loops, and conditionals.

Program Description

The monty hall problem is a famous statistical problem based on Monty Hall's famous "Let's make a Deal" TV show that was prominent in the 60's and the 70's. Monty Hall recently passed away, so this is a good oppotunity to learn about him and his famous problem.
Here's a clip from the original game show. Check out those hair-do's and the fantastic prizes!!! Original Game show
At the end of his show, he would present his contestant with three doors. The contestant would choose one of the three doors and would win the prize behind the door. One door would have a great prize, which we will call a CAR, and the other two had 'meh' prizes which we will call GOATS. The variation on this which give the "Monty hall problem" is the following:

1. Monty asks the contestant to pick a door
2. Monty then opens/reveals one of the losing doors
3. Monty gives the contestant the option to switch their choice to the other remaining closed door
4. The winning door is opened and it's determined if the contestant won or lost

The variation is allowing the user to switch their choice to the other door after opening one of the two losing doors. We will implement this now with our program!
This problem was also talked about in the movie "21". It talks about what the best strategy is when playing this game. The Monty Hall Problem from the movie "21"

Filename: **`monty.cpp`**
Start with THIS STARTER FILE. I've provided you all with a starter layout, as well as a function that will print out the doors (ascii art, yea!!!) for you to call whenever you need.

Functions

- In this assignment, you're required to have a function (name it whatever you prefer) that you call whenever you need a random door number generated. For instance, you'd call this function whenever you need to choose a "winning" door before the user begins playing your game. Your function should return the random winning door as an int. It should not take in any value.

- Also, create a function that is called when the user chooses to view their game statistics (choice 3). You

should pass the number of wins and the number of losses to this function. This function should print the stats as seen below in the sample runs (num of wins, losses, and the % of each to 1 decimal place). This function should NOT return a value. Name it whatever you choose.

- You must have these two functions explained above in your program in addition to main(). You're allowed to create any additional functions you choose.

In main():

- The user should be presented with the following menu:

```
Choose one of the following:
1 - Play Game
2 - View Stats
3 - Reset Stats
4 - Quit Game
```

The user can select any of the options. If they select a number besides 1,2,3,4, print an error message and force them to re-enter until they enter a valid value (You'll need a loop to force a valid entry).You'll present the user with this menu over and over until the user chooses to quit. See the sample runs below for exactly how your program should behave.

- Option 1: Play the game!
    - Call the printDoors function I provided in the starter file and ask the user to choose a random door. Choose a random winning door (call your function to reutrn to you a random door between 1-3).
    - Allow the player to pick a door
    - Reveal one of the doors that's a losing door (this must be a losing door, and also NOT the door the user chose). (NOTE: the door choice (for which to reveal to the player) need not be "random". Open any door that meets the conditions of losing door and ! user door).
    - Give the user the option to switch to the other remaining door.
    - Determine if they won or lost.

- Option 2: Print the game statistics. You should call your function to print the statistics when the user selects this option. If the user selects this option and they haven't yet played the game, print a message that states `No stats to display, 0 games played`

- Option 3: Reset the game stats to 0 wins 0 losses (0 games played)

- Option 4: Quit the game.

- Note: When you seed the random number generator, go ahead and use the time function, as illustrated in the class notes. Remember to seed at the beginning of main(), and only once in your program.

- NOTE ABOUT THE SAMPLE RUNS: Since this assignment involves randomness, you obviously should not get the exact same values as seen below, but you should be getting SIMILAR values/percentages.

Sample Run 1 (user input underlined)

```
Welcome to the Monty Hall Let's Make a Deal Simulator!

Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 2
No Stats to Display, 0 games played.


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 1
Pick a Door, 1, 2, or 3!

---------    ---------    ----------
|       |    |  ____ |    |  _____ |
|   |   |    |     | |    |      | |
|   |   |    |  ___| |    |   ___| |
|   |   |    | |     |    |      | |
|   |   |    | |____ |    |  ____| |
---------    ---------    ----------

Choice > 2
You chose door #2!
I'll now open a door for you randomly that you didn't choose!
Opening door #1 and it's a GOAT!
Now, I'll be a kind host and give you the chance to switch your door!
Would you like door #2 or #3? > 2
Opening door #2.....
baaaaaaaaaaaaa.... it's a GOAT!!!! You LOSE!


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 2
Results after 1 games:
Wins: 0         Losses: 1
Win %: 0.0              Loss %: 100.0


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 3
```

```
... Statistics Reset!


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 2
No Stats to Display, 0 games played.


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 4
Goodbye!
```

Sample Run 2 (user input underlined)

```
Welcome to the Monty Hall Let's Make a Deal Simulator!

Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 6
Invalid option, please retry > 7
Invalid option, please retry > -957
Invalid option, please retry > 0
Invalid option, please retry > 1
Pick a Door, 1, 2, or 3!

---------    ---------    ----------
|       |    |  ____ |    |  _____ |
|   |   |    |     | |    |      | |
|   |   |    |  ___| |    |   ___| |
|   |   |    | |     |    |      | |
|   |   |    | |____ |    |  ____| |
---------    ---------    ----------

Choice > 1
You chose door #1!
I'll now open a door for you randomly that you didn't choose!
Opening door #2 and it's a GOAT!
Now, I'll be a kind host and give you the chance to switch your door!
Would you like door #1 or #3? > 1
Opening door #1.....
baaaaaaaaaaaa.... it's a GOAT!!!! You LOSE!

Choose one of the Following:
```

```
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 1
Pick a Door, 1, 2, or 3!

---------    ---------    ----------
|       |    |  ____ |    |  _____ |
|   |   |    |     | |    |      | |
|   |   |    |  ___| |    |   ___| |
|   |   |    | |     |    |      | |
|   |   |    | |____ |    |  ____| |
---------    ---------    ----------

Choice > 2
You chose door #2!
I'll now open a door for you randomly that you didn't choose!
Opening door #1 and it's a GOAT!
Now, I'll be a kind host and give you the chance to switch your door!
Would you like door #2 or #3? > 2
Opening door #2.....
it's a BRAND NEW CAR!!!! YOU WIN!!!!

Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 4
Goodbye!
```

Sample Run 3 (user input underlined)

```
Welcome to the Monty Hall Let's Make a Deal Simulator!

Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 1
Pick a Door, 1, 2, or 3!

---------    ---------    ----------
|       |    |  ____ |    |  _____ |
|   |   |    |     | |    |      | |
|   |   |    |  ___| |    |   ___| |
|   |   |    | |     |    |      | |
|   |   |    | |____ |    |  ____| |
---------    ---------    ----------

Choice > 1
You chose door #1!
I'll now open a door for you randomly that you didn't choose!
```

```
Opening door #2 and it's a GOAT!
Now, I'll be a kind host and give you the chance to switch your door!
Would you like door #1 or #3? > 1
Opening door #1.....
it's a BRAND NEW CAR!!!! YOU WIN!!!!


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 1
Pick a Door, 1, 2, or 3!

---------    ---------    ----------
|       |    |  ____ |    |  _____ |
|   |   |    |     | |    |      | |
|   |   |    |  ___| |    |   ___| |
|   |   |    | |     |    |      | |
|   |   |    | |____ |    |  ____| |
---------    ---------    ----------

Choice > 3
You chose door #3!
I'll now open a door for you randomly that you didn't choose!
Opening door #2 and it's a GOAT!
Now, I'll be a kind host and give you the chance to switch your door!
Would you like door #3 or #1? > 3
Opening door #3.....
baaaaaaaaaaaaa.... it's a GOAT!!!! You LOSE!


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 2
Results after 2 games:
Wins: 1         Losses: 1
Win %: 50.0             Loss %: 50.0


Choose one of the Following:
1 Play the Game
2 See Stats
3 Reset Stats
4 Quit
> 4
Goodbye!
```

Requirements for the program

- The required tasks **must** be performed with the **functions** specified (**not** just with a single `main()` routine)
    - You must have both a function declaration and definition for your functions you write besides main()
    - Note that this exercise requires the writing of functions, and a main routine that uses those functions.
    - Each function should do *exactly* the task specified. NO more no less.
- NO global variables!
- When you write source code, it should be readable and well-documented. See the style guidelines. The appropriate header should be used.

Submitting:

Submit using the command:

```
~vastola/usub/submit1 monty.cpp
```