CSE 142, Spring 2015
Programming Assignment #5: Guessing Game (40 points)
Due: Tuesday, May 5, 2015, 11:00 PM

This assignment focuses on while loops and random numbers. Turn in a file named GuessingGame.java.

Your program allows the user to play a game in which the program thinks of a random integer and accepts guesses from the user until the user guesses the number correctly. After each incorrect guess, you will tell the user whether the correct answer is higher or lower. Your program must exactly reproduce the format and behavior of the logs in this document.

The log below shows one sample execution of your program. Your output will differ depending on the random numbers chosen and user input typed, but the overall output structure should match that shown below.

<< your haiku intro message here >>
I'm thinking of a number between 1 and 100...
Your guess? 50
It's lower.
Your guess? 25
It's higher.
Your guess? 35
It's lower.
Your guess? 30
It's higher.
Your guess? 32
It's lower.
Your guess? 31
You got it right in 6 guesses!
Do you want to play again? Y

I'm thinking of a number between 1 and 100...
Your guess? 50
It's higher.
Your guess? 75
It's lower.
Your guess? 65
It's lower.
Your guess? 64
You got it right in 4 guesses!
Do you want to play again? YES

I'm thinking of a number between 1 and 100...
Your guess? 60
It's lower.
Your guess? 20
It's higher.
Your guess? 30
It's higher.
Your guess? 40
It's higher.
Your guess? 50
It's lower.
Your guess? 47
It's higher.
Your guess? 49
You got it right in 7 guesses!
Do you want to play again? no

Overall results:
Total games   = 3
Total guesses = 17
Guesses/game  = 5.7
Best game     = 4

You should handle the special case where the user guesses the correct number on the first try. Print a message as follows:

I'm thinking of a number between 1 and 100...
Your guess? 71
You got it right in 1 guess!

Assume valid user input. When prompted for numbers, the user will type integers only, and they will be in proper ranges.
Implementation Guidelines:

I'm thinking of a number between 1 and 5...  
Your guess? 2  
It's higher.  
Your guess? 4  
It's lower.  
Your guess? 3  
You got it right in 3 guesses!  
Do you want to play again? yes

I'm thinking of a number between 1 and 5...  
Your guess? 3  
It's higher.  
Your guess? 5  
You got it right in 2 guesses!  
Do you want to play again? Nah

Overall results:  
Total games = 2  
Total guesses = 5  
Guesses/game = 2.5  
Best game = 2

<< your haiku intro message here >>

I'm thinking of a number between 1 and 100...  
*** HINT: The answer is 46  
Your guess? 50  
It's lower.  
Your guess? 25  
It's higher.  
Your guess? 48  
It's lower.  
Your guess? 46  
You got it right in 4 guesses!

(suggested initial simple version of program)

Define a class constant for the maximum number used in the games. The previous page's log shows games from 1 to 100, but you should be able to change the constant value to use other ranges such as from 1 to 50 or any maximum.

Use your constant throughout your code and do not refer to the number 100 directly. Test your program by changing your constant and running it again to make sure that everything uses the new value. A guessing game for numbers from 1 to 5 would produce output such as that shown at left. The web site shows other expected output cases.

Produce randomness using a single Random object, as seen in Chapter 5. Remember to import java.util.*;

Display rounded numbers using the System.out.printf command or a rounding method of your own.

Read user yes/no answers using the Scanner's next method (not nextLine, which can cause strange bugs when mixed with nextInt). To test whether the user's response represents yes or no, use String methods seen in Chapters 3-4 of the book. If you get an InputMismatchException, you are trying to read the wrong type of value from a Scanner.

Produce repetition using while or do/while loops. You may also want to review fencepost loops from Chapter 4 and sentinel loops from Chapter 5. Chapter 5's case study is a relevant example. Some students try to avoid properly using while loops by writing a method that calls itself, or a pair of methods A and B where A calls B and B calls A, creating a cycle of calls. Such solutions are not appropriate on this assignment and will result in a deduction. To help you solve the "best game" part of the program, you may want to read textbook section 4.2 on min/max loops.

Consider first writing a simpler version that plays a single guessing game. Ignore other features such as multiple games and displaying overall statistics.

While debugging it is useful to print a temporary "hint" message like that shown at left. This way you will know the correct answer and can test whether the program gives proper clues for each guess. This is also helpful for testing the "I guess" case.

Style Guidelines:

For this assignment you are limited to the language features in Chapters 1-5 shown in lecture and the textbook.

Structure your solution using static methods that accept parameters and return values where appropriate. For full credit, you must have at least the following two methods other than main in your program:

1. a method to play one game with the user  
   This method should not contain code to ask the user to play again. Nor should it play multiple games in one call.

2. a method to report the overall statistics to the user  
   This method should print the statistics only, not do anything else such as while loops or playing games.

You may define more methods if you like, although the limitation that methods can return only one value will limit how much you can decompose the problem. It is okay for some println statements to be in main, as long as you use good structure and main is a concise summary. For example, you can place the loop for multiple games and the prompt to play again in main.

Use whitespace and indentation properly. Limit lines to 100 characters. Give meaningful names to methods/variables, and follow Java's naming standards. Localize variables. Put descriptive comments at the start of your program and each method. Since this program has longer methods, also put brief comments inside methods on complex sections of code.