CMPSC 111
Introduction to Computer Science I
Fall 2013
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Recitation 4
19–20 September 2013
Due in Sakai by midnight
"Checkmark" grade

Summary

Practice with `Random`

A Quick Tutorial on Random Number Generation

To generate random numbers, we need an object of the `Random` class. I often name this variable `rng` (for "random number generator"), but you can name it anything you want—"`rand`" or "`random`" are good names, too. To create a new random number generator named `rand`, be sure to `import java.util.Random;` and then use:

Random rand = new Random();

The two most useful methods in the `Random` class are `nextInt` and `nextDouble`. If `rand` is the name of our random number generator and `n` is a positive integer, `rand.nextInt(n)` produces an `int` in the range 0, ..., n-1 and `rand.nextDouble()` produces a `double` in the range from 0 to 1 (not including 1).

By being clever, we can get different ranges—here are a few examples. In the Java code, assume `i` is an `int` variable, `d` is a `double` variable, and `rand` is an object of the `Random` class:

Desired Range	Java Statement
0, 1, 2, 3, 4, 5	i = rand.nextInt(6);
10, 11, ..., 19, 20	i = rand.nextInt(11) + 10;
-5, -4, -3, ..., 4, 5	i = rand.nextInt(11) - 5;
0, 3, 6, 9, 12	i = 3 * rand.nextInt(5);
-1, 1	i = 2 * rand.nextInt(2) - 1;
$0 \leq d < 1$	d = rand.nextDouble();
$0 \leq d < 10$	d = 10 * rand.nextDouble();
$-5 \leq d < 5$	d = 10 * rand.nextDouble() - 5;
0.0, 0.1, 0.2, ..., 0.9, 1.0	d = rand.nextInt(11)/10.0;

Exercise

Write a Java program to do the following:

- Generate and print a random integer in the range -3, -2, -1, . . . 4, 5. Label the output appropriately.

- Generate and print a random coin flip, "H" or "T" (HINT: use `"HT".charAt(...)`) Label the output appropriately.

- Generate a random value from the set -5.0, -4.5, -4.0, -3.5, . . . , 4.0, 4.5, 5.0. (Tricky! You can't do this with `nextDouble()`.) Label the output appropriately.

- Generate a random lower-case letter of the alphabet. (HINT: create a string containing all the letters of the alphabet and then use the `charAt` method along with a random number.) Label the output appropriately.

- Create two more problems of your own similar to the above, then solve them! (Example: print a random `double` number between 15.0 and 20.0; print a randomly-chosen letter from your own name; ask the user to enter two values and then generate random numbers between those two values; etc.)

Sample output (yours will be different, of course):

```
Your name
Recitation 4
Thu Feb 28 13:17:40 EST 2013

A random int between -3 and 5: -2
A random coin flip: T
A random value from the set -5, -4.5, ..., 4, 4.5, 5: 3.5
A random letter: t
.... two more of your own devising ...
```

At the end of the period, or by midnight of the day of your recitation, upload the file you just created (only the `.java` file, nothing else).

If you were unable to complete the exercise and have nothing to upload, please send me an email with the subject line "Recitation 4" and tell me what problems you encountered so that I can help you. (Actually, email me if you had any problems or questions, even if you uploaded something.)

General Guidelines for Recitation Sessions

- **Experiment!** Recitation sessions are for learning by doing without the pressure of grades or "right/wrong" answers. So try things! The best way to learn is by trying things out.

- **Submit** *something.* Your grade is just 0 or 1, depending on whether or not you attempt the work and upload something to Sakai.

- **Try to Finish During Class.** Recitation exercises are not intended to be the equal of laboratory assignments. If you are simply a slow typist, I've given you until the end of the day, but ideally you should upload a file, even a non-working one, by the end of the class period and be finished with it.

- **Help One Another!** If your neighbor is struggling and you know what to do, offer your help. Don't "do the work" for them, but advise them on what to type or how to handle things.

- **Review the Honor Code policy on the syllabus.** Remember that you may discuss programs with others, but programs that are nearly identical to others will be taken as evidence of violating the Honor Code.