CSC1003 Practice Outline Oct 24-28

Programming exercises about IO.

1. Write a program that reads in floating-point numbers (as many as the user enters) from standard input and
   a) prints the maximum and minimum values.
   b) prints the mean (average value) and sample standard deviation (square root of the sum of the squares of their differences from the average, divided by n-1, where n is the number of double values from input)

   Hint: you can use `Scanner` or `StdIn` for handling standard input streams, the latter needs to have `stdlib.jar` available.

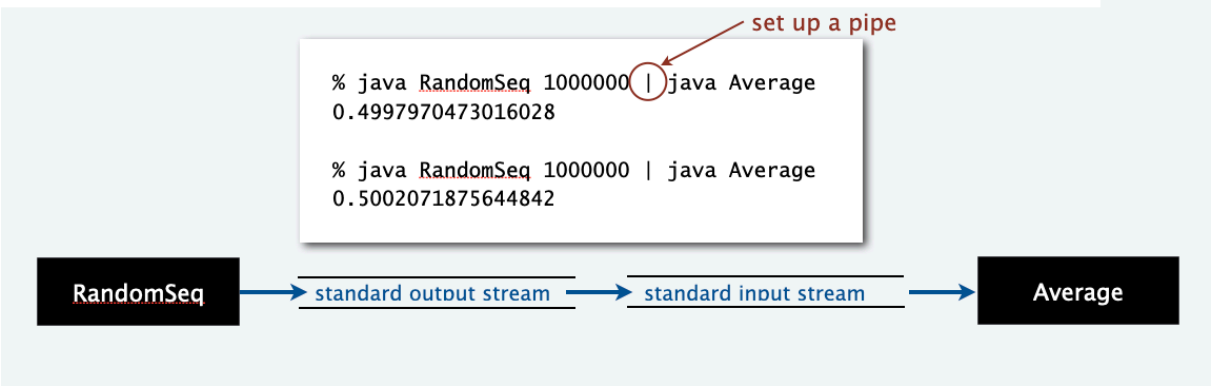
   To end the input stream from keyboard, you can use the following commands.

> **Q.** How do I specify the end of the stream?
>
> **A.** <Ctrl-d> (standard for decades).
>
> **A.** <Ctrl-z> (Windows).

You can also generate some random double values via `RandomSeq` program

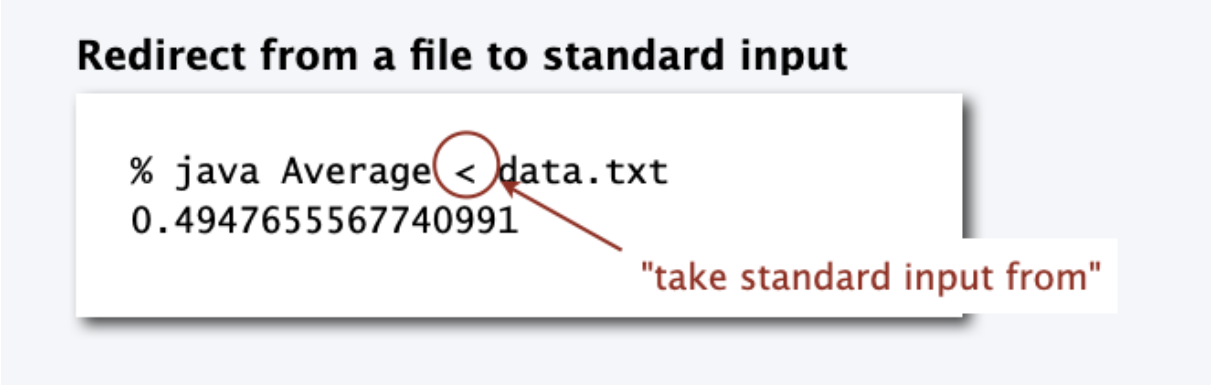
```
public class RandomSeq
{
   public static void main(String[] args)
   {
      int N = Integer.parseInt(args[0]);
      for (int i = 0; i < N; i++)
         System.out.println(Math.random());
   }
}
```

and use piping to connect the output of RandomSeq to the input of your new program (e.g., like the following figure)



2. Write a program that reads in a sequence of integers and prints both the integer that appears in a longest consecutive run and the length of that run. For example, if the input is `1 2 2 1 5 1 1 7 7 7 7 1 1`, then your program should print `Longest run: 4 consecutive 7s`.
3. Write a filter that reads in a sequence of integers and prints the integers, removing repeated values that appear consecutively. For example, if the input is `1 2 2 1 5 1 1 7 7 7 7 1 1`, then your program should print `1 2 1 5 1 7 1`.

   Hint: apart from typing the input via keyboard, you can also save the data into a text file and redirected the file to the input of your Java program (details can be found in lecture notes).

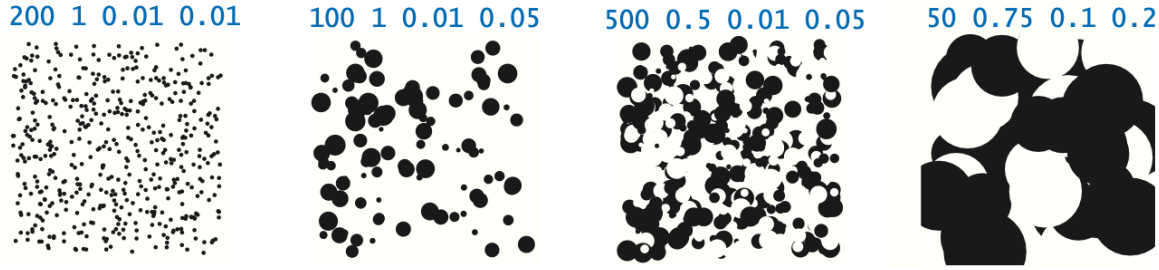


4. Read a positive integer x from the input, print true if x is a palindrome; otherwise, print false. A palindrome is an integer that reads the same in original order (from left to right) and in reverse order (from right to left). For example, 121 is a palindrome, but 123 is not.

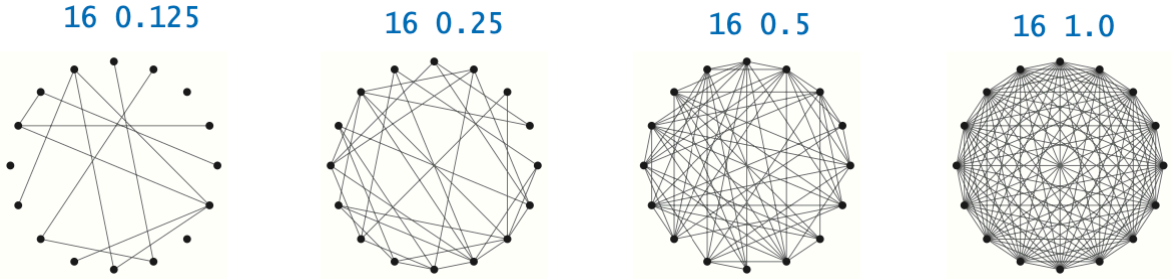
   Hint: you can use an array to store each digit of the number and check each pair in the array.

you can also think whether you can do this job without using an array.

5. [Optional] Write a program `Circles` that draws filled circles of random radii at random positions in the unit square, producing images like those below. Your program should take four command-line arguments: the number of circles, the probability that each circle is black, the minimum radius, and the maximum radius. The following figure give some possible output samples with given arguments.



6. [Optional] Write a program that takes as command-line arguments an integer n and a floating-point number p (between 0 and 1), plots n equally spaced points on the circumference of a circle, and then, with probability p for each pair of points, draws a gray line connecting them. *The following figure gives some possible outputs given the corresponding arguements.*



Hint: you can set the center point of the circle to be (0, 0), the radius to be 1, and scale the x-axis to (-1, 1), the y-axis to (-1, 1), then the (x,y) coordinates of each point on the circumference can be computed via the sine and cosine functions. Next, you can generate random edges based on the probabilities.