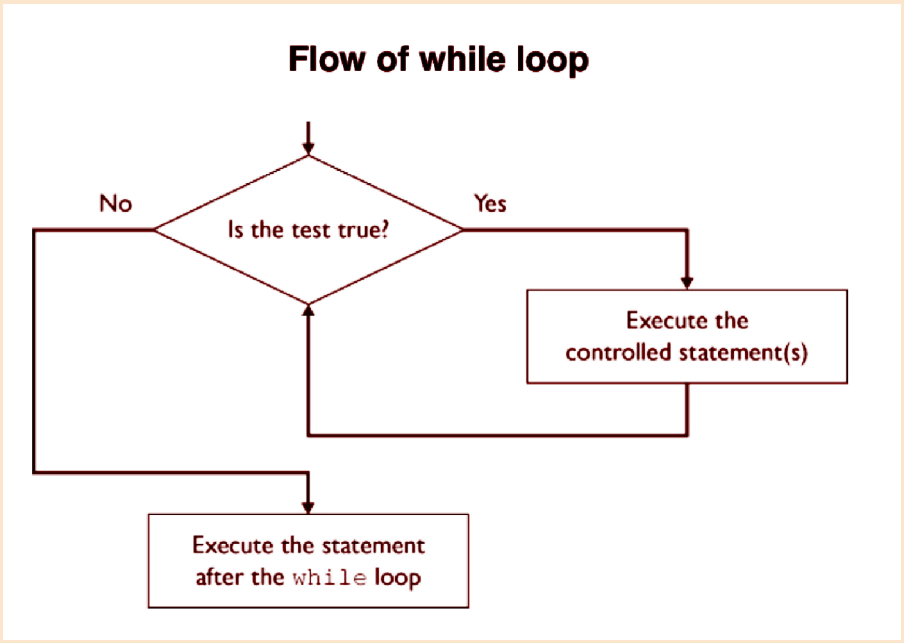
Chapter 5:

The loop performs its test and, if the test evaluates to true, executes the controlled statements



Pseudorandom Numbers: Numbers that, although they are derived from predictable and well-defined algorithms, mimic the properties of numbers chosen at random.

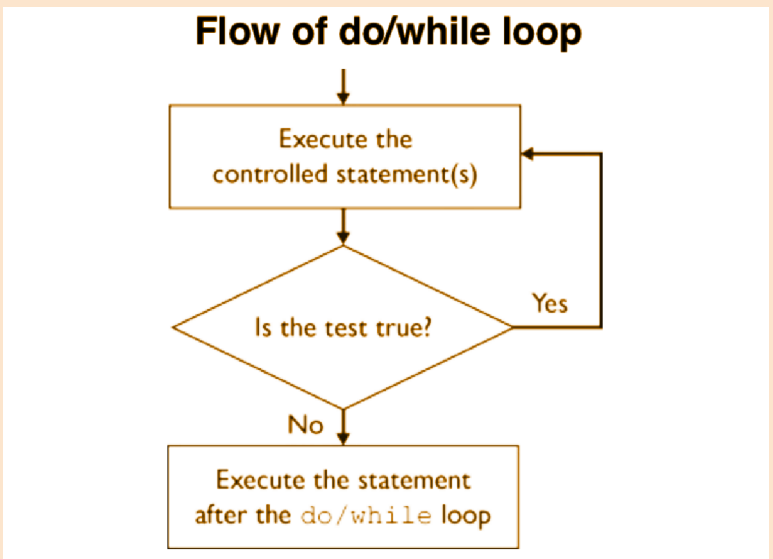
Java provides several mechanisms for obtaining pseudorandom numbers:

- Math.random()
  - This method provides a quick and easy way to get a random number (0.0≤Math.random()<1.0), and you can use multiplication to change the range of the numbers the method produces.
- Java also provides a class called Random

Useful Methods of Random Objects

Method	Description
`nextInt()`	Random integer between -2^{31} and $(2^{31} - 1)$
`nextInt(max)`	Random integer between 0 and (max – 1)
`nextDouble()`	Random real number between 0.0 (inclusive) and 1.0 (exclusive)
`nextBoolean()`	Random logical value of true or false

the do/while loop always executes its controlled statements at least once then the loop performs its test and, if the test evaluates to true, executes the controlled statements again




```
do {
    <statement>;
    ...
    <statement>;
} while (<test>);
```

Priming a Loop: Initializing variables before a loop to “prime the pump” and guarantee that the loop is entered

Fencepost Algorithms: Where you want to perform N tasks with N-1 things between them.

- To achieve this, place one "post" outside your loop, then alternate between "wires" and "posts" inside the loop

Fencepost with if:

- Inside the loop plant a "posts" and if this is not the last post attach some "wires"

Sentinel: A special value that signals the end of input

Logical Operators

Operator	Meaning	Example	Value
`&&`	AND (conjunction)	`(2 == 2) && (3 < 4)`	`true`
`||`	OR (disjunction)	`(1 < 2) || (2 == 3)`	`true`
`!`	NOT (negation)	`!(2 == 2)`	`false`

Truth Table for AND (`&&`)

p	q	p && q
true	true	true
true	false	false
false	true	false
false	false	false

Truth Table for NOT (`!`)

p	!p
true	false
false	true

Truth Table for OR (| |)

p	q	p || q
true	true	true
true	false	true
false	true	true
false	false	false

Table 5.5 De Morgan's Laws

Original expression	Negated expression	Simplified negation
p || q	!(p || q)	!p && !q
p && q	!(p && q)	!p || !q

Short-Circuited Evaluation: The property of the logical operators && and || that prevents the second operand from being evaluated if the overall result is obvious from the value of the first operand.

Robust: Ability of a program to execute even when presented with illegal data.

Method that prompts the user to enter correct data

```
// prompts until a valid number is entered
public static int getInt(Scanner console, String prompt) {
    System.out.print(prompt);
    while (!console.hasNextInt()) {
        console.next(); // to discard the input
        System.out.println("Not an integer; try again.");
        System.out.print(prompt);
    }
    return console.nextInt();
}
```

Assertion: A declarative sentence that is either true or false.

Provable Assertion: An assertion that can be proven to be true at a particular point in program execution.