CSE 121 – Lesson 5

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Music: 121 23sp Lecture Vibes 🌸

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Announcements, Reminders

- Creative Project 1 is out, due Tues April 18
- Resubmission Cycle 0 released yesterday, due Thurs April 20
- Feedback for C0 was released yesterday
  - Start tracking your grades in our Minimum Grade Guarantee Calculator
- Quiz 0: Thursday, April 20 during section
For loops are our first *control structure*

A syntactic structure that *controls* the execution of other statements.

```c
for ( initialization ; test ; update ) {
    body (statements to be repeated)
}
```
Fencepost Pattern

Some task where one piece is repeated $n$ times, and another piece is repeated $n-1$ times and they alternate

g-u-m-b-a-l-l
Fencepost Pattern

Some task where one piece is repeated $n$ times, and another piece is repeated $n-1$ times and they alternate.

\[ g-u-m-b-a-l-l \]
(PCM) Nested for loops

```java
for (int outerLoop = 1; outerLoop <= 5; outerLoop++) {
    System.out.println("outer loop iteration "+ outerLoop);
    for (int innerLoop = 1; innerLoop <= 3; innerLoop++) {
        System.out.println("inner loop iteration "+ innerLoop);
    }
    // at this point, innerLoop is OUT OF SCOPE!
    System.out.println(innerLoop);
}
```
What output is produced by the following code?

```java
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print(i);
    }
    System.out.println();
}
```

A. 1
    12
    123
    1234
    12345

B. i
    ii
    iii
    iiii
    iiii
What code produces the following output?

A. 
```java
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print(i);
    }
    System.out.println();
}
```

B. 
```java
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print(j);
    }
    System.out.println();
}
```

C. 
```java
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; j++) {
        System.out.print(j);
    }
    System.out.println();
}
```

D. 
```java
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i; i++) {
        System.out.print(j);
    }
    System.out.println();
}
```
A Random object generates *pseudo*-random numbers.

- The Random class is found in the `java.util` package

```java
import java.util.*;
```

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>nextInt()</code></td>
<td>Returns a random integer</td>
</tr>
<tr>
<td><code>nextInt(max)</code></td>
<td>Returns a random integer in the range [0, max), or in other words, 0 to max-1 inclusive</td>
</tr>
<tr>
<td><code>nextDouble()</code></td>
<td>Returns a random real number in the range [0.0, 1.0)</td>
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</tbody>
</table>
Pseudo-Randomness

Computers generate numbers in a predictable way using mathematical formulas.

Input may include current time, mouse position, etc.

True randomness is hard to achieve – we rely on natural processes
  • e.g., **atmospheric noise**, **lava lamps**