CSE 121 – Lesson 5

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Music: 121 23au Lecture Tunes

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Announcements, Reminders

- Creative Project 1 is out, due Tues October 17
- Resubmission Cycle 0 released yesterday, due Thurs October 19
  - Even if you're not resubmitting – read your feedback!!
- Quiz 0: Thursday, Oct 19 during section
  - Quiz logistics announcement
- Office Hour Problems (Miya's OH)

Last time: for loops!

For loops are our first *control structure*

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

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

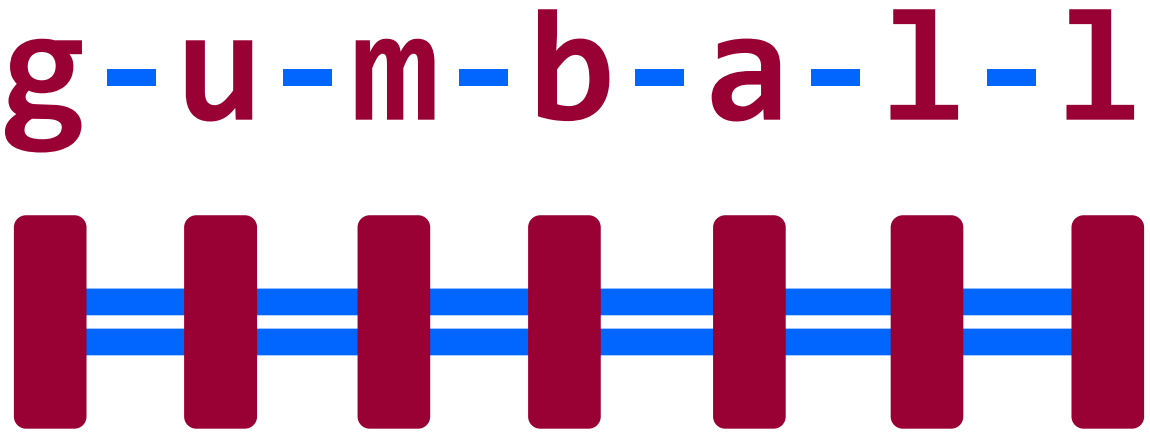
Fencepost Pattern

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



(PCM) Nested for loops

```
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);
    }
    System.out.println(outerLoop);
}
```

Poll in with your answer!

What output is produced by the following code?

```
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
iiiii
```

C.
```
1
22
333
4444
55555
```

Poll in with your answer!

What code produces the following output?

```
1
12
123
1234
12345
```

A.

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

C.

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

B.

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

D.

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

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

(PCM) Random

A Random object generates *pseudo*-random numbers.

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

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

Method	Description
`nextInt()`	Returns a random integer
`nextInt(`*max*`)`	Returns a random integer in the range [0, *max*), or in other words, 0 to *max*-1 inclusive
`nextDouble()`	Returns a random real number in the range [0.0, 1.0)

(PCM) Math

Calling:

`Math.<method>(…)`

Method	Description
`Math.abs(`*value*`)`	Returns the absolute value of *value*
`Math.ceil(`*value*`)`	Returns *value* rounded up
`Math.floor(`*value*`)`	Returns *value* rounded down
`Math.max(`*value1*`, `*value2*`)`	Returns the larger of the two values
`Math.min(`*value1*`, `*value2*`)`	Returns the smaller of the two values
`Math.round(`*value*`)`	Returns *value* rounded to the nearest whole number
`Math.sqrt(`*value*`)`	Returns the square root of *value*
`Math.pow(`*base*`, `*exp*`)`	Returns *base* raised to the *exp* power