

Java & JEE Training

Day 6 – Practice Session

MindsMapped Consulting

Practice Problems

MindsMapped Consulting

Nested for loops

- A loop placed inside another loop.

```
for (int i = 1; i <= 5; i++) {  
    for (int j = 1; j <= 10; j++) {  
        System.out.print("*");  
    }  
    System.out.println(); // to end the line  
}
```

- Output:

```
*****  
*****  
*****  
*****  
*****
```

The outer loop repeats 5 times; the inner one 10 times.

"sets and reps" exercise analogy

What is the output?

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

What is the output?

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

*
* *
* * *
* * * *
* * * * *

What is the output?

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

What is the output?

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

1
22
333
4444
55555

What is the output?

```
for (int i = 1; i <= 5; i++) {  
    for (int j = 1; i <= 10; j++) {  
        System.out.print("*");  
    }  
    System.out.println();  
}
```

What is the output?

```
for (int i = 1; i <= 5; i++) {  
    for (int j = 1; i <= 10; j++) {  
        System.out.print("*");  
    }  
    System.out.println();  
}
```

- Infinite Loop

What is the output?

```
for (int i = 1; i <= 5; i++) {  
    for (int j = 1; j <= 10; i++) {  
        System.out.print("*");  
    }  
    System.out.println();  
}
```

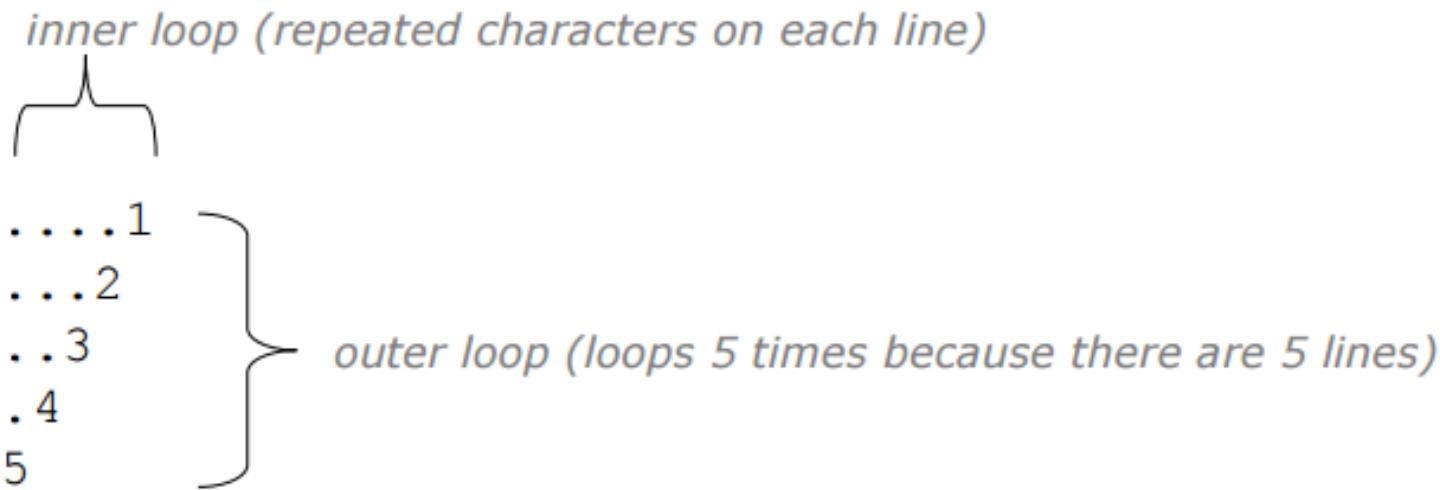
What is the output?

```
for (int i = 1; i <= 5; i++) {  
    for (int j = 1; j <= 10; i++) {  
        System.out.print("*");  
    }  
    System.out.println();  
}
```

- Infinite Loop

Generating Complex Line Outputs...

- What nested for loops produce the following output?



- We must build multiple complex lines of output using:
 - an outer "vertical" loop for each of the lines
 - inner "horizontal" loop(s) for the patterns within each line

Outer and Inner Loop

- First write the outer loop, from 1 to the number of lines.

```
for (int line = 1; line <= 5; line++) {  
    ...  
}
```

- Now look at the line contents. Each line has a pattern:
 - some dots (0 dots on the last line), then a number

```
....1  
...2  
.3  
.4  
5
```

- *Observation: the number of dots is related to the line number.*

Mapping loops to numbers

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

- What statement in the body would cause the loop to print:
4 7 10 13 16

Mapping loops to numbers

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

- What statement in the body would cause the loop to print:

4 7 10 13 16

```
for (int count = 1; count <= 5; count++) {  
    System.out.print(3 * count + 1 + " ");  
}
```

Loop tables

- What statement in the body would cause the loop to print:

2 7 12 17 22

- To see patterns, make a table of count and the numbers.
 - Each time count goes up by 1, the number should go up by 5.
 - But count * 5 is too great by 3, so we subtract 3.

count	number to print	$5 * \text{count}$	$5 * \text{count} - 3$
1	2	5	2
2	7	10	7
3	12	15	12
4	17	20	17
5	22	25	22

Nested for loop exercise

- Make a table to represent any patterns on each line.

.....1
...2
.3
.4
5

line	# of dots	$-1 * \text{line}$	$-1 * \text{line} + 5$
1	4	-1	4
2	3	-2	3
3	2	-3	2
4	1	-4	1
5	0	-5	0

```
for (int line = 1; line <= 5; line++) {  
    for (int j = 1; j <= (-1 * line + 5); j++) {  
        System.out.print(".");  
    }  
    System.out.println(line);  
}
```

What is the output?

```
for (int line = 1; line <= 5; line++) {  
    for (int j = 1; j <= (-1 * line + 5); j++) {  
        System.out.print(".");
    }
    for (int k = 1; k <= line; k++) {  
        System.out.print(line);
    }
    System.out.println();
}
```

What is the output?

```
for (int line = 1; line <= 5; line++) {  
    for (int j = 1; j <= (-1 * line + 5); j++) {  
        System.out.print(".");
    }
    for (int k = 1; k <= line; k++) {  
        System.out.print(line);
    }
    System.out.println();
}
```

Answer:

- 1
- 22
- 333
- 4444
- 55555

Write a program to...

```
    . . . . 1  
    . . . 2 .  
    . . 3 . .  
    . 4 . . .  
5 . . . .
```

Solution

```
for (int line = 1; line <= 5; line++) {  
    for (int j = 1; j <= (-1 * line + 5); j++) {  
        System.out.print(".");
    }
    System.out.print(line);
    for (int j = 1; j <= (line - 1); j++) {  
        System.out.print(".");
    }
    System.out.println();
}
```