

Homework – Nested Loop

1. Trace the following programs.

Program	Memory	Output
<pre>final int SIZE = 5; for (int i = 1; i < SIZE; i++) { for (int j = SIZE; j >= i; j--) { System.out.println(i * 2 + j); } }</pre>	<p>SIZE (final int): 5</p> <p>i (int): 1 2 3 4 5</p> <p>j (int): 5 4 3 2 1 0 5 4 3 2 1 5 4 3 2 5 4 3</p>	<p>7 6 5 4 3 9 8 7 6 11 10 9 13 12</p>
<pre>for (int j = 22; j <= 25; j++) { for (int k = 7; k <= 10; k++) { if (j % 2 == k % 2) { System.out.println(j); } else { System.out.println(k); } } System.out.println(); }</pre>	<p>j (int): 22 23 24 25 26</p> <p>k (int): 7 8 9 10 11 7 8 9 10 11 7 8 9 10 11 7 8 9 10 11</p>	<p>7 22 9 22 23 8 23 10 7 24 9 24 25 8 25 10</p>
<pre>for (int j = 8; j > 2; j-=2) { System.out.println(j + ":"); for (int k = 2; k <= j; k++) { System.out.print(j+k); } System.out.println(); }</pre>	<p>j (int): 8 6 4 2</p> <p>k (int): 2 3 4 5 6 7 8 9 2 3 4 5 6 7 2 3 4 5</p>	<p>8: 1013141516 6: 89101112 4: 678</p>

2. **Rectangle.java** Write a program that draws a rectangle with stars, given the number of rows and columns.

Sample Input	Sample Output
Enter # of rows: 5 Enter # of columns: 4	**** **** **** **** ****

3. **TableOfNumbers.java** Write a program that will prompt user for two numbers x & y then output a table of numbers with x rows and each of the rows lists number from 1 to y, separated by a space.

Sample Input	Sample Output
Enter x: 5 Enter y: 6	1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6

4. **TriangleOfNumbers.java** Write a program using nested loops that prints the following pattern.

```
1
12
123
1234
12345
```

5. **PythagoreanTriples.java** Three positive integers a, b, and c with $a < b < c$ form a Pythagorean triplet if $a^2 + b^2 = c^2$. For example 3, 4, 5 form a Pythagorean triplet since $3^2 + 4^2 = 5^2$. Write a program that first prompts the user for a positive integer and then finds and prints all Pythagorean triplets whose largest member is less than or equal to that integer.