Lab worksheet 2: Introduction

1. Write a Java program to print out the numbers 10 through 49 in the following manner,

   10 11 12 13 14 15 16 17 18 19
   20 21 22 23 24 25 26 27 28 29
   30 31 32 33 34 35 36 37 38 39
   40 41 42 43 44 45 46 47 48 49

```java
public class Main {
    public static void main(String[] args) {
        int count = 0;
        for (int i = 10; i <= 49; i++) {
            System.out.print(i + " ");
            count++;
            if (count == 10) {
                System.out.println();
                count = 0;
            }
        }
    }
}
```

2. Write a method that returns the number of digits in an integer argument; for example, 23,498 has five digits. Using this method, write a Java program that repeatedly asks for input and displays the number of digits the input integer has. Stop the repetition when the input value is negative.

```java
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int number;
        do {
            System.out.print("Enter an integer: ");
            number = scanner.nextInt();
            if (number >= 0) {
                int digitCount = countDigits(number);
                System.out.println("Total digits: " + digitCount);
            }
        } while (number >= 0);
            System.out.println("Program exited.");
    }

    public static int countDigits(int number) {
        int count = 0;
```

```
        // Handle the case of 0 separately
        if (number == 0) {
            return 1;
        }

        // Take the absolute value to handle negative numbers
        number = Math.abs(number);

        while (number > 0) {
            number = number / 10;
            count++;
        }

        return count;
    }
}
```

3. Write a Java program that prints a pattern of asterisks in the shape of a pyramid. The number of rows in the pyramid should be entered by the user.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of rows: ");
        int rows = scanner.nextInt();
        int spaces = rows - 1;
        int asterisks = 1;
        for (int i = 1; i <= rows; i++) {
            // Print spaces
            for (int j = 1; j <= spaces; j++) {
                System.out.print(" ");
            }
            // Print asterisks
            for (int k = 1; k <= asterisks; k++) {
                System.out.print("*");
            }
            System.out.println(); // Move to the next line
            spaces--;
            asterisks += 2;
        }
    }
}
```

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4. Write a Java program that accepts five numbers as input from the user, stores them in an integer array, and then determines and displays the second-largest element in the array.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        // Create an array to store the numbers
        int[] numbers = new int[5];
        // Create a scanner to accept user input
        Scanner scanner = new Scanner(System.in);
        // Prompt the user to enter five numbers
        System.out.println("Enter five numbers, one at a time:");
        // Read and store the numbers in the array
        for (int i = 0; i < 5; i++) {
            System.out.print("Number " + (i + 1) + ": ");
            numbers[i] = scanner.nextInt();
        }
        // Close the scanner
        scanner.close();
        // Find the second-largest element
        int largest = Integer.MIN_VALUE;
        int secondLargest = Integer.MIN_VALUE;
        for (int number : numbers) {
            if (number > largest) {
                secondLargest = largest;
                largest = number;
            } else if (number > secondLargest && number < largest) {
                secondLargest = number;
            }
        }
        // Check if there's a second-largest element
        if (secondLargest == Integer.MIN_VALUE) {
            System.out.println("There is no second-largest element.
All elements are the same.");
        } else {
            System.out.println("The second-largest element is " +
secondLargest + ".");
        }
    }
}
```

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5. Write a Java program that checks whether a given sentence is a palindrome. To do this, you need to:
    - Use a StringTokenizer to split the sentence into words.
    - Ignore punctuation and spaces when checking for palindromes. For example, "A man, a plan, a canal, Panama!" should be considered a palindrome.
    - Convert each word to lowercase for case-insensitive comparison.
    - Output whether the sentence is a palindrome or not.

```
import java.util.StringTokenizer;

public class Main {
    public static void main(String[] args) {
        // Get the sentence from the user
        System.out.print("Enter a sentence: ");
        String input = System.console().readLine();
        // Remove spaces and punctuation, and convert to
        // lowercase
        String cleanInput = input.replaceAll("[^a-zA-Z]",
"").toLowerCase();

        // Use StringTokenizer to split the cleaned sentence
        // into words
        StringTokenizer tokenizer = new
StringTokenizer(cleanInput);

        // Reconstruct the cleaned sentence without spaces
        StringBuilder reversed = new StringBuilder();
        while (tokenizer.hasMoreTokens()) {
                reversed.insert(0, tokenizer.nextToken());
        }

        // Check if the cleaned sentence is a palindrome
        if (cleanInput.equals(reversed.toString())) {
            System.out.println("The sentence is a
palindrome.");
        } else {
            System.out.println("The sentence is not a
palindrome.");
        }
    }
}
```