Lab 24

Self Practice Solution: Java Loop Statements

**Task: Explain different example codes for Java Loop Statements**

`for` Loop Examples:

1. Printing Even Numbers from 2 to 10

public class ForLoopExample1 {

public static void main(String[] args) {

for (int i = 2; i <= 10; i += 2) {

System.out.println(i);

}

}

}

In this example, a `for` loop is used to print even numbers from 2 to 10 by incrementing `i` by 2 in each iteration.

2. Calculating the Factorial of a Number

public class ForLoopExample2 {

public static void main(String[] args) {

int n = 5;

int factorial = 1;

for (int i = 1; i <= n; i++) {

factorial \*= i;

}

System.out.println("Factorial of " + n + " is " + factorial);

}

}

This program calculates the factorial of a number (in this case, 5) using a `for` loop.

3. Iterating Over an Array

public class ForLoopExample3 {

public static void main(String[] args) {

int[] numbers = {1, 2, 3, 4, 5};

for (int i = 0; i < numbers.length; i++) {

System.out.println(numbers[i]);

}

}

}

This example demonstrates how to iterate over an array and print its elements using a `for` loop.

4. Printing a Triangle of Stars

public class ForLoopExample4 {

public static void main(String[] args) {

int rows = 5;

for (int i = 1; i <= rows; i++) {

for (int j = 1; j <= i; j++) {

System.out.print("\* ");

}

System.out.println();

}

}

}

Here, a `for` loop is used to print a triangle of stars.

5. Looping Through a String

public class ForLoopExample5 {

public static void main(String[] args) {

String message = "Hello, Java!";

for (int i = 0; i < message.length(); i++) {

System.out.print(message.charAt(i) + " ");

}

}

}

This example uses a `for` loop to iterate through each character of a string and print them individually.

`while` Loop Examples:

1. Countdown from 10 to 1

public class WhileLoopExample1 {

public static void main(String[] args) {

int count = 10;

while (count >= 1) {

System.out.println(count);

count--;

}

}

}

In this example, a `while` loop is used to countdown from 10 to 1.

2. Finding the First Power of 2 Greater Than 1000

public class WhileLoopExample2 {

public static void main(String[] args) {

int powerOfTwo = 1;

while (powerOfTwo <= 1000) {

powerOfTwo \*= 2;

}

System.out.println("The first power of 2 greater than 1000 is: " + powerOfTwo);

}

}

This program uses a `while` loop to find the first power of 2 greater than 1000.

3. User Input Validation

import java.util.Scanner;

public class WhileLoopExample3 {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

int number;

System.out.print("Enter a positive number: ");

number = scanner.nextInt();

while (number <= 0) {

System.out.print("Invalid input. Please enter a positive number: ");

number = scanner.nextInt();

}

System.out.println("You entered: " + number);

scanner.close();

}

}

This example uses a `while` loop to ensure that the user enters a positive number.

4. Sum of Digits of a Number

public class WhileLoopExample4 {

public static void main(String[] args) {

int number = 12345;

int sum = 0;

while (number > 0) {

int digit = number % 10;

sum += digit;

number /= 10;

}

System.out.println("The sum of digits is: " + sum);

}

}

This program calculates the sum of digits of a number using a `while` loop.

5. Generating Random Numbers Until a Condition is Met

import java.util.Random;

public class WhileLoopExample5 {

public static void main(String[] args) {

Random rand = new Random();

int randomNumber;

do {

randomNumber = rand.nextInt(100); // Generate a random number between 0 and 99

System.out.println("Random number: " + randomNumber);

} while (randomNumber % 7 != 0);

System.out.println("Random number divisible by 7 found.");

}

}

In this example, a `do-while` loop generates random numbers until a number divisible by 7 is found.

**`do-while` Loop Examples:**

1. Menu-Driven Calculator

import java.util.Scanner;

public class DoWhileLoopExample1 {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

char choice;

double num1, num2, result;

do {

System.out.println("Calculator Menu:");

System.out.println("1. Addition");

System.out.println("2. Subtraction");

System.out.println("3. Multiplication");

System.out.println("4. Division");

System.out.println("5. Quit");

System.out.print("Enter your choice (1-5): ");

choice = scanner.next().charAt(0);

switch (choice) {

case '1':

System.out.print("Enter two numbers: ");

num1 = scanner.nextDouble();

num2 = scanner.nextDouble();

result = num1 + num2;

System.out.println("Result: " + result);

break;

case '2':

// Similar logic for subtraction

break;

case '3':

// Similar logic for multiplication

break;

case '4':

// Similar logic for division

break;

case '5':

System.out.println("Exiting the calculator.");

break;

default:

System.out.println("Invalid choice. Please enter a valid option.");

}

} while (choice != '5');

scanner.close();

}

}

This program implements a menu-driven calculator using a `do-while` loop to repeatedly display the menu and perform calculations based on user input.

2. Rolling a Dice Until a 6 is Rolled

import java.util.Random;

public class DiceRoll {

public static void main(String[] args) {

Random random = new Random();

int rollResult;

int attempts = 0;

do {

rollResult = random.nextInt(6) + 1; // Generate a random number between 1 and 6 (inclusive)

System.out.println("Roll #" + (attempts + 1) + ": You rolled a " + rollResult);

attempts++;

} while (rollResult != 6);

System.out.println("Congratulations! You rolled a 6 after " + attempts + " attempts.");

}

}