**JS Practical 3 (Part 2)**

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### **JavaScript Looping Constructs Lab Manual**

In JavaScript, loops allow you to execute a block of code multiple times based on certain conditions. Loops are very useful in situations where repetitive tasks need to be performed.

This lab will cover the following looping constructs:

1. **for loop**
2. **while loop**
3. **do-while loop**

We will break down each loop type with its definition, syntax, and provide examples of increasing complexity.

## **1. for Loop**

### **Definition:**

A for loop repeats a block of code for a set number of times. It is typically used when you know beforehand how many times you want to execute the loop.

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### **Syntax:**

for (initialization; condition; update) {

// Code to be executed

}

* **Initialization**: Usually used to initialize a counter variable (e.g., let i = 0).
* **Condition**: The loop will continue as long as this condition evaluates to true (e.g., i < 5).
* **Update**: This part executes after each iteration (e.g., i++ to increment i).

### **Examples:**

#### **Example 1: Basic for Loop**

Print numbers 1 through 5.

for (let i = 1; i <= 5; i++) {

console.log(i);

}

#### **Example 2: for Loop with Array**

Print each element of an array.

let fruits = ["Apple", "Banana", "Cherry"];

for (let i = 0; i < fruits.length; i++) {

console.log(fruits[i]);

}

#### **Example 3: for Loop with a Step Value**

Print numbers from 0 to 10, stepping by 2 each time.

for (let i = 0; i <= 10; i += 2) {

console.log(i);

}

## **2. while Loop**

### **Definition:**

A while loop repeats a block of code as long as the specified condition evaluates to true. It is commonly used when you don’t know in advance how many times the loop should run.

### **Syntax:**

while (condition) {

// Code to be executed

}

* **Condition**: This condition is checked before each iteration. The loop will continue as long as it evaluates to true.

### **Examples:**

#### **Example 1: Basic while Loop**

Print numbers from 1 to 5.

let i = 1;

while (i <= 5) {

console.log(i);

i++; // Increment to avoid infinite loop

}

#### **Example 2: while Loop with Array**

Print each element of an array.

let fruits = ["Apple", "Banana", "Cherry"];

let i = 0;

while (i < fruits.length) {

console.log(fruits[i]);

i++;

}

#### **Example 3: while Loop with a Condition**

Print numbers from 10 down to 1.

let i = 10;

while (i >= 1) {

console.log(i);

i--;

}

## **3. do-while Loop**

### **Definition:**

A do-while loop is similar to the while loop, but it guarantees that the loop’s block of code is executed at least once, because the condition is checked **after** the code execution.

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### **Syntax:**

do {

// Code to be executed

} while (condition);

* The code inside the do block is executed **once** before the condition is checked.
* The loop continues running as long as the condition evaluates to true.

### **Examples:**

#### **Example 1: Basic do-while Loop**

Print numbers from 1 to 5.

let i = 1;

do {

console.log(i);

i++;

} while (i <= 5);

#### **Example 2: do-while Loop with Array**

Print each element of an array.

let fruits = ["Apple", "Banana", "Cherry"];

let i = 0;

do {

console.log(fruits[i]);

i++;

} while (i < fruits.length);

#### **Example 3: do-while Loop with a Condition**

Print numbers from 1 to 10.

let i = 1;

do {

console.log(i);

i++;

} while (i <= 10);

## **Differences Between for, while, and do-while Loops**

| **Feature** | **for Loop** | **while Loop** | **do-while Loop** |
| --- | --- | --- | --- |
| **Execution Condition** | Condition is checked before each iteration. | Condition is checked before each iteration. | Condition is checked after each iteration. |
| **When to Use** | When you know the number of iterations beforehand. | When you don’t know the number of iterations in advance. | When you need to execute the loop at least once. |
| **Syntax** | for (initialization; condition; update) {} | while (condition) {} | do { } while (condition); |
| **Example Use Case** | Looping through an array with a known size. | Looping while a dynamic condition is met. | Asking for user input at least once before checking if the condition is met. |

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