Theory Assignment

Question 1: What are variables in JavaScript? How do you declare a variable using var, let, and const?

Variables in JavaScript:

Variables are containers for storing data values. They act as placeholders for data that can be referenced and manipulated during program execution.

Declaring Variables:

- **var**: The old way to declare variables. It has function scope and can be redeclared and updated.

```
var x = 10;

console.log(x); // Output: 10
```

- **let**: Introduced in ES6, it has block scope and can be updated but not redeclared within the same scope.

```
let y = 20;

y = 25; // Allowed

console.log(y); // Output: 25
```

- **const**: Also introduced in ES6, it has block scope and cannot be updated or redeclared. Used for variables that should not change.

```
const z = 30;

// z = 35; // Error: Assignment to constant variable

console.log(z); // Output: 30
```

Question 2: Explain the different data types in JavaScript. Provide examples for each.

JavaScript has **two categories** of data types:

1. **Primitive Data Types**
    - **String**: Represents textual data.

```
let name = "John";

console.log(typeof name); // Output: "string"
```

- **Number**: Represents numeric values (both integers and floating-point).

```
let age = 25;

let price = 99.99;

console.log(typeof age); // Output: "number"
```

- **Boolean**: Represents true or false.

```
let isLoggedIn = true;

console.log(typeof isLoggedIn); // Output: "boolean"
```

- **Undefined**: A variable that has been declared but not assigned a value.

```
let x;

console.log(typeof x); // Output: "undefined"
```

- **Null**: Represents an intentional absence of a value.

```
let data = null;

console.log(typeof data); // Output: "object" (quirk of JavaScript)
```

- **Symbol**: Represents a unique and immutable value.

```
let sym = Symbol("id");

console.log(typeof sym); // Output: "symbol"
```

- **BigInt**: Represents integers larger than 2^53 - 1.

```
let bigNumber = 1234567890123456789012345678901234567890n;

console.log(typeof bigNumber); // Output: "bigint"
```

2. **Non-Primitive Data Types**

- **Object**: Used to store collections of data or more complex entities.

```
let person = { name: "John", age: 30 };

console.log(typeof person); // Output: "object"
```

Question 3: What is the difference between undefined and null in JavaScript?

Feature	undefined	null
Definition	A variable is declared but not initialized.	Represents an intentional absence of a value.
Type	Primitive data type.	Primitive data type.
Default Value	Assigned to variables not initialized.	Must be explicitly assigned.
Example	let x; console.log(x); // undefined	let y = null; console.log(y); // null