Notes on let, const, and var in JavaScript

Introduction

JavaScript provides three ways to declare variables: `var`, `let`, and `const`. Each has different behaviors related to scope, hoisting, reassignment, and mutability. Understanding their differences is crucial for writing clean and bug-free code.

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1. var

- **Introduced in:** ES5 and earlier.
- **Scope:** Function-scoped (not block-scoped).
- **Hoisting:** Variables declared with `var` are hoisted to the top but initialized as `undefined`.
- **Reassignment:** Can be reassigned.
- **Redeclaration:** Allowed within the same scope.

Example:

```
 function exampleVar() {
    if (true) {
        var x = 10;
    }
    console.log(x); // 10 (not block-scoped)
}
exampleVar();
```

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2. let

- **Introduced in:** ES6 (ES2015).

- **Scope:** Block-scoped.
- **Hoisting:** Hoisted but not initialized (cannot be accessed before declaration).
- **Reassignment:** Can be reassigned.
- **Redeclaration:** Not allowed within the same scope.

Example:

```
 function exampleLet() {
    if (true) {
        let y = 20;
    }
    console.log(y); // ReferenceError: y is not defined
}
exampleLet();
```

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3. const

- **Introduced in:** ES6 (ES2015).
- **Scope:** Block-scoped.
- **Hoisting:** Hoisted but not initialized.
- **Reassignment:** Not allowed (immutable variable binding).
- **Redeclaration:** Not allowed within the same scope.
- **Mutability:** Objects and arrays declared with `const` can have their properties modified, but the reference itself cannot be changed.

Example:

```
 const z = 30;
z = 40; // TypeError: Assignment to constant variable.
 const obj = { name: "Alice" };
obj.name = "Bob"; // Allowed (object properties can change)
```

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Key Differences: `var` vs `let` vs `const`

Feature	var	let	const
Scope	Function-scoped	Block-scoped	Block-scoped
Hoisting	Hoisted with `undefined`	Hoisted but not initialized	Hoisted but not initialized
Reassignment	Allowed	Allowed	Not allowed
Redeclaration	Allowed	Not allowed	Not allowed
Mutability	Mutable	Mutable	Immutable reference
Use Case	Avoid using	Preferred for mutable values	Use for constants

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Best Practices

1. **Use `const` by default**: If a variable does not need to be reassigned, always use `const`.
2. **Use `let` for mutable variables**: When reassignment is required, prefer `let`.
3. **Avoid `var`**: Since `var` is function-scoped and can lead to unexpected behaviors, it should generally be avoided in modern JavaScript.

Conclusion

Understanding the differences between `var`, `let`, and `const` helps in writing safer and more predictable JavaScript code. `var` should be avoided in favor of `let` and `const`, which provide better scoping and prevent accidental variable redeclaration.