JS Review & Intro to Algorithms

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What we will cover on Mon-Tues

Introduction: The flow of a program (left to right, top to bottom)

Logical Thinking II: Pen and paper exercises
- What is an Algorithm?
- Analyzing problems: Input and Output
- Coming up with solutions: writing algorithms

Decisions:
- Conditional algorithms
- The conditional statement: `if(<boolean>){ ... }`
- Syntax debugging VIII: Unclosed curly braces
- The default case: `else { ... }`
- Reading a program II (skipping unmet cases)

Block Scope:
- Code block definition: `if` example
- A word on indentation and readability
- Scope definition: difference between `var`, `let`, `const`
- When to use: `if` vs. ternary operator

Understanding Program Execution in JS

```
let a = 'Hello World!';
function first() {
console.log('Inside first function');
second();
console.log('Again inside first function');
}

function second() {
console.log('Inside second function');}
first();
console.log('Inside Global Execution Context');
```

- Global Execution Context
- Functional Execution Context

Control Flow in JS

- When your program contains more than one statement, the statements are executed as if they are a story, from top to bottom.
- You almost never want your programs to start from the first line of code and simply execute every line, straight to the end.
- Flow control statements can decide with JS instructions to execute under which conditions

Control Flow in JS

```
let theNumber = Number(prompt("Pick a number"));

console.log("Your number is the square root of " +  theNumber * theNumber);
```

Conditional Execution (1)

Not all programs are straight roads. We may, for example, want to create a branching road, where the program takes the proper branch based on the situation at hand. This is called *conditional execution*.

One of the ways Conditional execution is created in JS is with the "if" keyword in JavaScript. In the simple case, we want some code to be executed if, and only if, a certain condition holds. We might, for example, want to show the square of the input only if the input is actually a number.
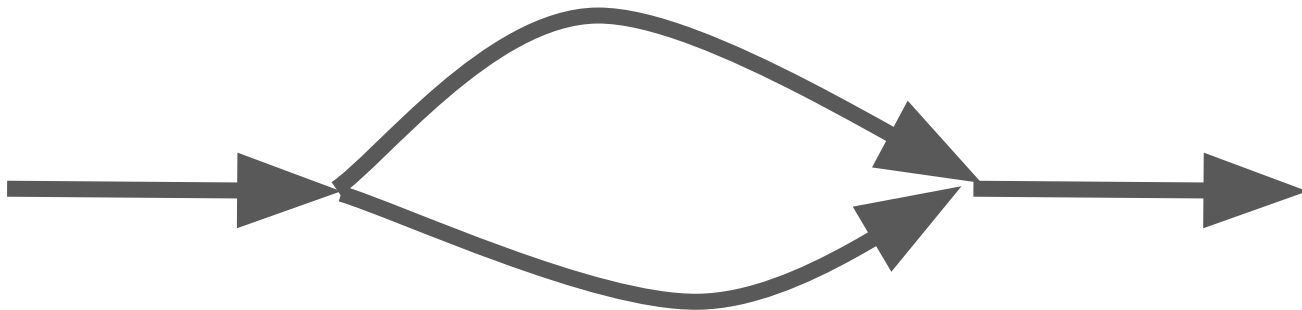
Conditional Execution (3)

```
let theNumber = Number(prompt("Pick a number"));

if (!Number.isNaN(theNumber)) {

  console.log("Your number is the square root of " +

        theNumber * theNumber);

}
```

Exercise

[if-else] Write a JavaScript program that prompts for an employee name, SSN, rate of pay, and hours worked, and computes the total pay for the employee. If the hours worked is greater than 40, use one and the half for overtime rate (for hours beyond 40) and compute accordingly.

var name = prompt("Employee's Name", "Name");

var ssn = prompt("Social Security Number for " + name, "000-00-0000");

var wage= prompt("Hourly wage for" + name, "5.25");

var hours = prompt("How many hours did" + name + " work?", "40");

var total;

if (hours <= 40)

       total = hours * wage;

Algorithms

What are algorithms?

- An algorithm is a step-by-step process designed to achieve some outcome. Computers are the greatest machines ever conceived for doing step-by-step processes.
- As a result, the study of algorithms is very closely tied to computers, computer science, and programming.
- Algorithms are important to computer science, but they aren't exclusively part of computer science.
- Pseudocode is the name for the specialized way that computer scientists express algorithms. Fundamentally, pseudocode is just a list of instructions.