JavaScript Hard-Level Practice Questions

# Introduction

* Write a script that generates a random number between 1 and 100 and asks the user to guess it. Provide hints ("Too High", "Too Low") until the correct number is guessed.
* Create a script that continuously accepts user input until the word "STOP" is entered. Print all inputs in reverse order at the end.

# JavaScript Variables

* Demonstrate variable shadowing by declaring variables with the same name in nested scopes. Show how values change across different scopes.
* Create a script that swaps values between two variables without using a third variable.

# Operators

* Write a program that evaluates a quadratic equation **ax² + bx + c = 0** and prints its real roots (if any).
* Implement a program that takes two times (hours and minutes) and finds the difference between them using arithmetic operators.

# Conditionals

* Build a small program that simulates a login system: prompt for username and password, and validate against predefined credentials with limited attempts.
* Write a script that determines whether a given year is a leap year using nested conditionals.

# Loops

* Create a script that prints all prime numbers between 1 and 200.
* Write a program that prints a pyramid pattern of stars up to n rows using nested loops.

# Built-in Types

* Write a program that accepts a date string (e.g., "2025-09-04") and prints the day of the week using Date objects.
* Convert a large number into readable currency format with commas (e.g., 1234567 → 1,234,567).

# Arrays

* Write a program to rotate an array to the left by k positions without using built-in array rotation functions.
* Implement a function that merges two sorted arrays into a single sorted array without using sort().
* Create a function that finds the **second largest** and **second smallest** elements in an array.

# Regular Expressions

* Write a regex that validates whether a given string is a valid IPv4 address.  
  - Contains at least one uppercase, one lowercase, one digit, and one special character
* Extract all hashtags from a sentence like:  
  "Learning #JavaScript and #WebDevelopment is fun!"
* Validate if a string is a strong password: at least 10 characters, includes uppercase, lowercase, numbers, and special characters.

# Creating a Function

* Create a recursive function that calculates the nth Fibonacci number.
* Write a function that accepts a sentence and returns the word with the maximum length.
* Implement a function that checks whether two strings are **anagrams** of each other.

# Function Expressions

* Write a function expression that returns a new array with only unique elements (no duplicates) without using Set.
* Create an arrow function that takes an array of numbers and returns an array of **squares of only the even numbers**.

# Function Hoisting

* Demonstrate the difference between function declaration and function expression by showing what happens when each is called before its definition.
* Write a code snippet that uses hoisting to incorrectly calculate a value, then refactor it to fix the issue.