Weekly Coding Session 7

Find Numbers with Even Number of Digits
Description: Given an array nums of integers, return how many of them contain an even number of digits.

Example:
Input: nums = [12, 345, 2, 6, 7896]
Output: 2

Maximum 79 Number
Description: Given a positive integer num consisting only of digits 7 and 9, return the maximum number you can get by changing at most one digit.

Example:
Input: num = 9779
Output: 9979

Squares of a Sorted Array
Description: Given an integer array nums sorted in non-decreasing order, return an array of the squares of each number, sorted in non-decreasing order.

Example:
Input: nums = [-4, -1, 0, 3, 10]
Output: [0, 1, 9, 16, 100]

Intersection of Two Arrays II
Description: Given two integer arrays nums1 and nums2, return an array of their intersection. Each element in the result must appear as many times as it shows in both arrays.

Example:
Input: nums1 = [4,9,5], nums2 = [9,4,9,8,4]
Output: [4,9]

Longest Substring Without Repeating Characters
Description: Given a string s, find the length of the longest substring without repeating characters.

Example:
Input: s = "abcabcbb"
Output: 3

Trapping Rain Water
Platform: LeetCode

Description: Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.

Example:
Input: height = [0,1,0,2,1,0,1,3,2,1,2,1]
Output: 6

Data Science Questions

Linear Regression Using Normal Equation

Write a Python function that performs linear regression using the normal equation. The function should take a matrix X (features) and a vector y (target) as input, and return the coefficients of the linear regression model. Round your answer to four decimal places, -0.0 is a valid result for rounding a very small number.

Example:

input: X = [[1, 1], [1, 2], [1, 3]], y = [1, 2, 3]

output: [0.0, 1.0]

reasoning: The linear model is y = 0.0 + 1.0*x, perfectly fitting the input data.

Calculate Covariance Matrix
Write a Python function that calculates the covariance matrix from a list of vectors. Assume that the input list represents a dataset where each vector is a feature, and vectors are of equal length.

Example:

input: vectors = [[1, 2, 3], [4, 5, 6]]

output: [[1.0, 1.0], [1.0, 1.0]]

reasoning: The dataset has two features with three observations each. The covariance between each pair of features (including covariance with itself) is calculated and returned as a 2x2 matrix.