CL1002 – Programming Fundamentals Lab
Practice Problems

Problem: 1 | Ocean Levels

Assuming the ocean's level is currently rising at about 1.5 millimeters per year, write a program that displays a table showing the number of millimeters that the ocean will have risen each year for the next 25 years.

Problem: 2 | Two Sum

Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.

You may assume that each input would have exactly one solution, and you may not use the same element twice.

You can return the answer in any order.

Example 1:

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Input: nums = [2,7,11,15], target = 9

Output: [0,1]

Explanation: Because nums[0] + nums[1] == 9, we return [0, 1].
```

Example 2:

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Input: nums = [3,2,4], target = 6

Output: [1,2]
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Example 3:

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Input: nums = [2,11,7,15], target = 9

Output: [0,2]

Explanation: Because nums[0] + nums[2] == 9, we return [0, 2].
```

Problem: 3

The population of a town A is less than the population of town B. However, the population of town A is growing faster than the population of town B. Write a program that prompts the user to enter the population and growth rate of each town. The program outputs after how many years the population of town A will be greater than or equal to the population of town B and the populations of both the towns at that time. (A sample input is: Population of town A = 5000, growth rate of town A = 4%, population of town B = 8000, and growth rate of town B = 2%.).

Problem: 4

The number, 197, is called a circular prime because all rotations of the digits: 197, 971, and 719, are themselves prime.

There are thirteen such primes below 100: 2, 3, 5, 7, 11, 13, 17, 31, 37, 71, 73, 79, and 97.

How many circular primes are there below one million?

Problem: 5 | Distance Traveled

The distance a vehicle travels can be calculated as follows:

distance = speed * time

For example, if a train travels 40 miles per hour for 3 hours, the distance traveled is 120 miles.

Write a program that asks the user for the speed of a vehicle (in miles per hour) and how many hours it has traveled. The program should then use a loop to display the distance the vehicle has traveled for each hour of that time period. Here is an example of the output:

What is the speed of the vehicle in mph? 40

How many hours has it traveled? 3

Hour Distance Traveled

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1 40

2 80

3 120

Input Validation: Do not accept a negative number for speed and do not accept any value less than 1 for time traveled.

Problem: 6

Write a program that allows two players to play a game of tic-tac-toe. Use a two-dimensional char array with three rows and three columns as the game board. Each element of the array should be initialized with an asterisk (*). The program should run a loop that

- Displays the contents of the board array
- Allows player 1 to select a location on the board for an X. The program should ask the user to enter the row and column number.
- Allows player 2 to select a location on the board for an O. The program should ask the user to enter the row and column number.
- Determines whether a player has won, or a tie has occurred. If a player has won,the program should declare that player the winner and end. If a tie has occurred, the program should say so and end.

Player 1 wins when there are three Xs in a row on the game board. The Xs can appear in a row, in a column, or diagonally across the board. A tie occurs when all of the locations on the board are full, but there is no winner.