**Instructions: You will have one shift to complete this examination in its entirety. You may use the Internet, your existing tools and work computer. You may NOT consult with any other person in the office and you may NOT look at the work being done by any other person in the office. FAILURE TO ATTEMPT TO PERFORM AS MANY PROBLEMS AS YOU ARE CAPABLE WILL RESULT IN FAILING THE ENTIRE EXAMINATION. Good luck!**

# Instructions

Below you will find a set of coding problems. For each challenge, you will use T-SQL, C#, or JavaScript to solve the challenge, up to you which one.

Before you start solving a problem, make sure to estimate the time to completion and the actual time taken.

ONCE YOU SOLVE A PROBLEM, LET A PROCTOR (TEST ADMINISTRATOR) KNOW IMMEDIATELY.

## Problem 1 – Land Dispute

Kosovo and Serbia face a series of land disputes. There are a number of properties of variable size (e.g. – 1,000 m2, 6,233 m2). They agree that only properties that may be divided in half with no remainder will be split.

Write an algorithm that will determine whether a property of any size may be divided in half with no remainder.

**Estimate: 1h**

**Actual: 1h**

## Problem 2 – Running Total

Write an algorithm that computes the running total of a list. In other words, as you modify the list, it computes the total after the modification.

**Estimate: 1.5h**

**Actual: 0.5h**

## Problem 3 – Same First and Last

Write an algorithm that returns the number of words in a given sentence that have the same first and last letter.

Example: “My Dad took me to the movies.” -> 1 (Dad)

**Estimate:1h**

**Actual:1h**

## Problem 4 – Numbers in Strings

Write an algorithm that takes an array of strings and returns an array with only the strings that contain numbers within.

Example: [‘1a’, ‘fl’, ‘ca’, ‘b5’, ‘c’] -> [‘1a’, ‘b5’]

**Estimate: 1h**

**Actual: 1.5h**

## Problem 5 – Temperature Convertor

Write an algorithm that can convert Celsius to Fahrenheit and Fahrenheit to Celsius. It should not allow bad input and return an error if incorrect values are entered.

Example: 19 degrees F -> -7 degrees C

**Estimate: 1h**

**Actual: 0.5h**

## Problem 6 – Remove Duplicates from a Sorted Array

Given a sorted array, remove the duplicates in place such that each element appears only once and return the new length.

**Estimate: 1.5h**

**Actual: 0.5h**

## Problem 7 – Length of Last Word

Given a string of any length which consists of just alphabetic characters and spaces, return the length of the last word (non-space characters) in the string. If the last word does not exist, return 0.

Example: “This is an example sentence” -> 8

**Estimate: 1h**

**Actual: 0.5h**

## Problem 8 – Nested Braces

Given a string possibly containing any of the brace types ({}, [], ()), write an algorithm that returns a Boolean indicating whether the braces are properly nested.

Example:

function(‘{(test)}’) -> true

function(‘{{(test))}}’) -> false

**Estimate:1.5h**

**Actual:1h**

## Problem 9 – Maximize Profit

Given an array of prices of any size, where each item in the array represents a price on a specific day, write an algorithm to determine the day that would yield the maximum profit if you were to buy on day i and then sell on the following day.

Example: [2, 5, 4, 3, 6, 1, 1, 5, 4] -> 7 (value 5 versus 1 the day prior)

**Estimate: 1h**

**Actual: 0.5h**

## Problem 10 – Color of the Final Ball

You have 20 blue balls and 14 red balls in a bag.   
You put your hand in and remove 2 at a time.

If they’re of the same color, you add a blue ball to the bag.

If they’re of different colors, you add a red ball to the bag.

( You have enough blue and red balls to fill the bag up for as long as you need ).

When you take the two balls out, you don’t put them back in, so the number of balls in the bag keeps decreasing.

Write and algorithm to solve what will be the color of the last ball left in the bag.

**Estimate:2h**

**Actual:1h**

## Bonus Problem 1 – Dark Mode Toggle

Write an algorithm that takes in all of the CSS color styles for a given HTML page and toggles them between Light and Dark modes.

**Estimate: 0.5h**

**Actual: 0.5h**