**Coding Problems**

**Objective**

This assignment aims to demonstrate how to study a data structures or algorithms question in depth to prepare for an industry coding interview.

**Group Size**

Please complete this individually.

**Outline**

**Part 1:**

Below is a table of problems from a popular coding practice site, [Leetcode](https://leetcode.com/). You will need to create a free account of access the problems. You will randomly pick 2 questions from the table. These questions may involve any topic before and including lecture 4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [One](https://leetcode.com/problems/delete-node-in-a-bst/) | [Five](https://leetcode.com/problems/two-sum/) | [Nine](https://leetcode.com/problems/convert-sorted-array-to-binary-search-tree/) | [Thirteen](https://leetcode.com/problems/symmetric-tree/) | [Seventeen](https://leetcode.com/problems/same-tree/) | [Twenty-one](https://leetcode.com/problems/find-the-middle-index-in-array/) |
| [Two](https://leetcode.com/problems/leaf-similar-trees/?envType=daily-question&envId=2024-01-09) | [Six](https://leetcode.com/problems/roman-to-integer/description/) | [Ten](https://leetcode.com/problems/unique-number-of-occurrences/) | [Fourteen](https://leetcode.com/problems/invert-binary-tree/) | [Eighteen](https://leetcode.com/problems/contains-duplicate/description/) | [Twenty-two](https://leetcode.com/problems/count-number-of-pairs-with-absolute-difference-k/) |
| [Three](https://leetcode.com/problems/assign-cookies/?envType=daily-question&envId=2024-01-09) | [Seven](https://leetcode.com/problems/contains-duplicate/) | [Eleven](https://leetcode.com/problems/binary-tree-paths/) | [Fifteen](https://leetcode.com/problems/number-of-senior-citizens/) | [Nineteen](https://leetcode.com/problems/missing-number/) | [Twenty-three](https://leetcode.com/problems/first-bad-version/solutions/) |
| [Four](https://leetcode.com/problems/search-insert-position/) | [Eight](https://leetcode.com/problems/kth-largest-element-in-an-array/) | [Twelve](https://leetcode.com/problems/minimum-amount-of-time-to-fill-cups/) | [Sixteen](https://leetcode.com/problems/sum-of-left-leaves/) | [Twenty](https://leetcode.com/problems/majority-element/) | [Twenty-four](https://leetcode.com/problems/range-sum-of-bst/?envType=daily-question&envId=2024-01-09) |

**Part 2:**

In two Jupyter Notebook (.ipynb) file, one for each problem, write down the following:

* Paraphrase the problem in your own words
* Create 2 new examples of each problem
* Code the solution in Python (code chunk). Try to find the best time and space complexity solution!
* Explain why your solution works
* Explain the problem’s and space complexity
* Explain the thinking to an alternative solution (no coding required, but a classmate reading this should be able to code it up based off your text)

Alternatively, you may use a Quarto file, or Word document with code screenshotted. However, we highly recommended you learn how to use a Jupyter Notebooks.

Export each .ipynb file as a pdf. There are online converters, you can use the print option, or Google Collab has a printing feature. Please ensure all code and text is visible.

**Submission Requirements**

Create and submit a public GitHub repository with the following:

* Two PDFs of the problems you have solved

**Evaluation Criteria**

* Problem is accurately stated in the student’s own words
* Two examples are correct and easily understandable
* Correctness, time, and space complexity of the coding solution
* Clarity in explaining why the solution works, its time and space complexity
* Clarity in the proposal to the alternative solution

**Submission Deadline**