

Data Structures and Algorithms in Python

Assignment 12

Handed out: 3/4/24

Due: 3/7/24

This assignment is a follow-up to Project 3. For this assignment you will implement algorithms that manipulate the data structure you were assigned for Project 3.

<https://www.techiedelight.com/> - We will use this website as a source for problems.

You will write up a complete solution and test cases in Python for a problem from that website. **You may not use generative AI for assistance on this assignment.** Tools like ChatGPT or Gemini can solve these sorts of problems very well, but you will not learn from copying a solution directly. Productive struggle is essential when grappling with unfamiliar ideas, please adhere to this expectation.

You may complete this assignment individually or in a group:

- Individually: one problem
- Group of two: two problems
- Group of three: three problems

On the following page there are suggested problems for each topic. You may choose problems that are not on the list, but you should run it by me first. Each problem on the website has an estimated difficulty (Easy/Medium/Hard). If you (or your group) **only** complete problems from the “Easy” tier, the maximum grade you can earn on this assignment is 85%. Meaning if your group completes at least one “Medium” or “Hard” problem you will be eligible for a grade above 85%.

Submission

You should submit a .py file that you created in VS Code. You can use the TechieDelight website for initial testing, but for the final product should be written in VS Code, and you should come up with your own test case to show that the solution works. Upload your .py file to CREEKnet, and you will briefly present the problem you worked on to the class.

Suggested Problems

Binary Trees

<https://www.techiedelight.com/?problem=SplitBinaryTree> (Easy)

<https://www.techiedelight.com/?problem=CheckIdenticalBinaryTrees> (Easy)

<https://www.techiedelight.com/?problem=HeightOfBinaryTree> (Easy)

<https://www.techiedelight.com/?problem=IsBST> (Medium)

<https://www.techiedelight.com/?problem=FixBinaryTree> (Hard)

<https://www.techiedelight.com/?problem=BinaryTreeToDoublyLinkedList> (Hard)

Heaps

<https://www.techiedelight.com/?problem=ConnectNRopes> (Easy)

<https://techiedelight.com/?problem=ReplaceElementsWithRank> (Easy)

<https://www.techiedelight.com/?problem=IsBinaryTreeMinHeap> (Medium)

<https://www.techiedelight.com/?problem=CheckMinHeap> (Medium)

<https://www.techiedelight.com/?problem=KthLargestElement> (Medium)

<https://www.techiedelight.com/?problem=BSTToMinHeap> (Hard)

Stacks & Queues

<https://www.techiedelight.com/?problem=ConstructStack> (Easy)

<https://www.techiedelight.com/?problem=ConstructQueue> (Easy)

<https://www.techiedelight.com/?problem=BalancedExpression> (Easy)

<https://www.techiedelight.com/?problem=ReverseStack> (Medium)

<https://www.techiedelight.com/?problem=DuplicateParenthesis> (Medium)

<https://www.techiedelight.com/?problem=MinStack> (Hard)