



Faculty of Mathematical Economics

Data Structures and Algorithms

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DSEB Class of 2021 - 2024

Homework Assignment Week 3

Topic: Recursion

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Problem 1: Recursion Fundamentals

Give the appropriate answers for the questions below:

1. What is recursion? What are two types of cases in recursion?
2. Compare between Recursion vs. Iteration? What is the advantage of recursion over iterative (loop) approach?

Problem 2: Find Factorial

Write a program to find the factorial of the following numbers:

- 10
- 100
- 200
- 1000
- 10000

Problem 3: Power Of Number

Using recursion, write a program to calculate the power of a number. For example:

```
1 def calculate_power(number, power):  
2     """  
3     number: int  
4     power: int  
5     """  
6     # insert your code here  
7  
8 calculate_power(2, 5) -> 32  
9 # 2 ** 5 = 32
```

Problem 4: Quick Sort Algorithm

Implement the Quick Sort Algorithm. Sort the following arrays.

- 4, 1, 3, 9, 7
- 10, 7, 8, 9, 1, 5
- 2, 1, 6, 10, 4, 1, 3, 9, 7

Problem 5: Reverse String

Using recursion, write a program to reverse the following strings:

- "Vietnam"
- "Ronaldo"
- "DSEB63"
- "Data Science"
- "Miss Universe"

Problem 6: Hanoi Tower Problem

Solve the Hanoi tower problem with the height of n .

[Introduction to the Hanoi Tower Problem](#)

[Illustration of the problem is here](#)

Guidelines for submission

- Your submission must be under the .ipynb format.
- Your submission will be graded and it is likely that homework grade will contribute as a component in your GPA.
- If your submission is later than the due date without special consideration approval, you will receive a penalty on your mark.