

National University of Computer and Emerging Sciences, Lahore

Campus



Course:	Advanced Programming	Course Code:	CS 2000
Program:	BS (CS)	Semester:	Fall 2024
Due Date	September 3,2024	Total Marks:	100
Section:	7A , 7B	Page(s):	2
Type:	Assignment 1		

Instructions: For this assignment, each question should be solved in a separate .js file, clearly labeled with the question number (e.g., question1.js). Ensure that your code produces meaningful console outputs that clearly demonstrate the functionality of your solution. Submissions must be turned in on time; late submissions may not be accepted. Any form of plagiarism will result in an automatic grade of 0. Make sure that your code is well-structured and commented, where necessary, to improve readability and showcase your problem-solving approach.

Question 1:

Write a function `flattenArray` that takes a deeply nested array of integers and returns a flattened array. For example, given the input `[[1, [2, [3]]], 4, [5, [6, [7]]]]`, the output should be `[1, 2, 3, 4, 5, 6, 7]`. Implement the function without using `Array.prototype.flat()`

Question:2

Write a function `rotateArray` that rotates an array of integers in place to the right by `k` steps. For example, given the array `[1,2,3,4,5,6,7]` and `k = 3`, the output should be `[5,6,7,1,2,3,4]`. Do this in $O(1)$ space.

Question:3

Write a function that takes an array of integers and performs the following operations:

- Reverse the array.
- For each element in the reversed array, if the element is even, divide it by 2. If it's odd, multiply it by 3 and add 1.
- Filter out all elements greater than 100.
- Return the sum of the remaining elements.
- For example, given `[5, 12, 7, 9, 4, 6]`, after processing, the output should be the sum of the final array.

Question:4

Write a function that takes a 2D matrix (an array of arrays) and returns its elements in a zigzag order (top to bottom, left to right, then right to left, alternating). For example, given:

```
[  
  [1, 2, 3],  
  [4, 5, 6],  
  [7, 8, 9]  
]
```

Output: `[1, 2, 3, 6, 5, 4, 7, 8, 9]`

Question:5

You are given an array of integers array and a variable number of additional arguments (integers) using the rest operator. You need to complete a function that:

- Splits the input array into two parts: the first half and the second half. If the array has an odd length, the extra element should go to the first half. Otherwise to second half.
- Combines the half of the array with the rest of the additional arguments provided using the rest operator.
- Finds the sum of the combined elements and multiplies it by the sum of the elements in the second half of the array.
- Returns the result

Example: arr = [1, 2, 3, 4, 5, 6] Output:990

Question: 6

Create a **Cart** Object that manages a shopping cart. The cart should store items as objects, each containing details like **name**, **size**, **price**, and **quantity**. The Cart should include the following methods:

- **addItem(item):** This method takes an item object and adds it to the cart. If the item already exists in the cart (based on the name and size), it should update the quantity instead of adding a new entry.
- **removeItem(name, size):** This method removes an item from the cart based on its name and size. If the item doesn't exist, return a message indicating that the item is not found.
- **calculateTotal():** This method calculates and returns the total cost of all items in the cart based on their price and quantity.
- **displayCart():** This method returns a summary of all items in the cart, listing each item's name, size, price, quantity, and the total price for that item.

Each item object passed to the addItem function should have the structure:

{ **name: string, size: string, price: number, quantity: number** }

The Cart object should store items using an array of objects internally.