

Bit wise exercises

1. Even and Odd Numbers Using Bitwise AND

Write a program that determines whether a number is even or odd using the bitwise AND operator (&).

2. Bitwise XOR for Array Pairs

Create a program that takes an array of integers and finds the unique element. Using only bit-wise operators.

3. Bit Count Implementation

Build a function that counts the number of 1s in the binary representation of a number using bitwise operations. This will familiarize students with loops and the & operator.

4. Binary Palindrome Checker

Create a function to check whether the binary representation of a number is a palindrome.

5. Find Longest Sequence of 1s

Given a number, find the length of the longest sequence of consecutive 1s in its binary representation.

Challenge: Optimize using bitwise tricks.

6. Find the Next Higher Number with the Same Number of Set Bits

Write a program that finds the next higher integer that has the same number of 1s in its binary representation.

Hint: Use bitwise operations and an efficient algorithm to swap bits.

7. Bitwise Sudoku Validator *

Develop a program in C# that validates whether a given Sudoku grid satisfies the rules of Sudoku, using bitwise operations to efficiently track numbers in rows, columns, and sub-grids.

OOP

1. Моделирайте клас C# клас Point с полета които описват координатите на точката.

Класът да съдържа два конструктора - един без параметри и втори с два параметъра, които дават стойности на полетата. Да се имплементира метод, който приема като параметър друга точка и изчислява разстоянието между двете точки.

2. Vehicle Management System

Create a class hierarchy representing various vehicles, applying OOP principles such as inheritance, encapsulation, abstraction, and polymorphism. Each vehicle must have Brand, Model, Year, Fuel Type (use enum) and can Drive and have method which Display some information for the vehicle. Implement classes for the following vehicles: Car, Motorcycle, Truck, Bus, Bicycle, Electric car. Some of the vehicles like Bus have Passenger capacity. Think of some characteristics for the other vehicles.