Binary Maze Challenge

1.Initial Binary Number:

1100101011110010

2. Logical Gates Room

- AND Gate with 1010110010101101 = 1000100010100000
- OR Gate with 0111001100110011 = 1111101110110011
- XOR Gate with 1101110111001110 = 0010011001111101
- NOT Gate on 0010011001111101 = 1101100110000010

3. Binary Conversion Room

- Binary Result : 1101100110000010
- Converting to Decimal : 1101100110000010 (binary) = 55554 (decimal)

(i). Add 123:

55554 + 123 = 55677

(ii). Multiply by 7:

55677 * 7 = 389739

(iii). Converting Final Result to Binary:

389739 (decimal) = 1011111100010101011 (binary)

4. Weighted Binary Balancing

Binary Weights:

1001 = 9, 1100 = 12, 1110 = 14, 1010 = 10, 0111 = 7, 0101 = 5, 0011 = 3, 1111 = 15,

1101 = 13, 1011 = 11, 0110 = 6, 0100 = 4, 0010 = 2, 0001 = 1, and an unknown heavier binary number.

The heaviest binary number is `1111` (15), but the unknown number is heavier.

5. Binary Tree Navigation

Binary Tree Depth 5 Path to node `10111` with an even number of `1`s:

Valid path : `11011` (has 4 `1`s)

6. Binary Sequence Game

Binary Sequence : 10101011010100101110

Minimum Number of Moves Required: 3 moves

(2,4,6) , (9,11,13) , (14,16,20)

7. Binary Palindromes

Binary Number: 1011011101

Checking for Palindrome: 1011011101 (not a palindrome)

Minimum Bit Flips Required: 1 move

Transformed Binary Number: 1011111101

8. Complex Binary Patterns

10-bit Binary Numbers with Exactly Four `1`s:

0000001111 = 15

0000010111 = 23

0000011011 = 27

0000011101 = 29

0000011110 = 30

0000100111 = 39

0000101011 = 43

0000101101 = 45

0000101110 = 46

0000110011 = 51

0000110101 = 53

0000110110 = 54

0000111001 = 57

0000111010 = 58

0000111100 = 60

0001000111 = 71

0001001011 = 75

0001001101 = 77

0001001110 = 78

0001010011 = 83

0001010101 = 85

0001010110 = 86

0001011001 = 89

0001011010 = 90

0001011100 = 92

0001100011 = 99

0001100101 = 101

0001100110 = 102

0001101001 = 105

0001101010 = 106

0001101100 = 108

0001110001 = 113

0001110010 = 114

0001110100 = 116

0001111000 = 120

0010000111 = 135

0010001011 = 139
0010001101 = 141
0010001110 = 142
0010010011 = 147
0010010101 = 149
0010010110 = 150
0010011001 = 153
0010011010 = 154
0010011100 = 156
0010100011 = 163
0010100101 = 165
0010100110 = 166
0010101001 = 169
0010101010 = 170
0010101100 = 172
0010110001 = 177
0010110010 = 178
0010110100 = 180
0010111000 = 184
0011000011 = 195
0011000101 = 197
0011000110 = 198
0011001001 = 201
0011001010 = 202
0011001100 = 204
0011010001 = 209
0011010010 = 210
0011010100 = 212
0011011000 = 216
0011100001 = 225
0011100010 = 226
0011100100 = 228

0011101000 = 232
0011110000 = 240

9. Binary XOR Pairs with Constraints

Array of Binary Numbers:

101010, 011011, 110100, 001101, 100110, 111111, 000000

Pair with Maximum XOR Result: (101010, 001101)

XOR Result: 100111(binary) = 39(decimal)

10. Binary Multiples and Remainders

Binary Number: 1101010

Decimal equivalent: 1101010 (binary) = 106 (decimal)

Check whether 106 is a multiple of 7:

106 % 7 = 1 (not a multiple of 7)

Algorithm to Check Multiples of 7:

1. Convert binary to decimal.

2. Use modulo(%) operation to check divisibility.

Final Result Calculation

Final Binary Result: 1011111100010101011

Decimal equivalent: 389739

Multiply by 5 :

389739 * 5 = 1948695

Final Result: 1948695