Binary Maze Challenge

In binary number :11001010111100102

AND gate operation with :10101100101011012

By operating this two output is :10001000101000002

Result from AND gate :10001000101000002

OR gate operation with :01110011001100112

By operating this two output is :11111011101100112

Result from OR gate :11111011101100112

XOR gate operation with :11011101110011102

By operating this two output is :00100110011111010

Result from XOR gate :00100110011111010

By applying NOT gate operation output is :11011001100000101

Finally the result is :11011001100000101

3.Binary Conversion Room

Binary number is:11011001100000101

The decimal form of it's

=1(2^16)+1(2^15)+0(2^14)+1(2^13)+1(2^12)+0(2^11)+1(2^10)+1(2^

9)+0(2^8)+0(2^7)+0(2^6)+0(2^5)+0(2^4)+0(2^3)+1(2^2)+0(2^1)+1(2^0)=107133

So,the decimal form of 11011001100000101 is 107133

For 107133 add 123: 107133+123 =107256

Multiply 107256 by 7:107256*7=750792

The binary form of 750792 is:10110110001101000000

4.Weighted Binary Balancing

Converting all 15 binary numbers to decimal form:

1)1001=1(2^0)+0(2^1)+0(2^2)+1(2^3)

=1+0+0+8=9

2)1100=0(2^0)+0(2^1)+1(2^2)+1(2^3)

=0+0+4+8=12

3)1110=0(2^0)+1(2^1)+1(2^2)+1(2^3)

=0+2+4+8=14

4)1010=0(2^0)+1(2^1)+0(2^2)+1(2^3)

=0+2+0+8=10

5)0111=1(2^0)+1(2^1)+1(2^2)+0(2^3)

=1+2+4+0=7

6)0101=1(2^0)+0(2^1)+1(2^2)+0(2^3)

=1+0+4+0=5

7)0011=1(2^0)+1(2^1)+0(2^2)+0(2^3)

=1+2+0+0=3

8)1111=1(2^0)+1(2^1)+1(2^2)+1(2^3)

=1+2+4+8=15

9)1101=1(2^0)+0(2^1)+1(2^2)+1(2^3)

=1+0+4+8=13

10)1011=1(2^0)+1(2^1)+0(2^2)+1(2^3)

=1+2+0+8=11

11)0110=0(2^0)+1(2^1)+1(2^2)+0(2^3)

=0+2+4+0=6

12)0100=0(2^0)+0(2^1)+1(2^2)+0(2^3)

=0+0+4+0=4

13)0010=0(2^0)+0(2^1)+1(2^2)+0(2^3)

=0+0+4+0=4

14)0001=0(2^0)+0(2^1)+0(2^2)+8(2^3)

=0+0+0+8=8

8)1111 is the heaviest value(15) among the list

5.Binary Tree Navigation

Given binary number:10111

Path of the binary number:Root→Right→Left→Right→Right

Number of 1's:4

The path from the root to the node contains an even number of 1's

6.Binary Sequence Game

Given binary sequence of length 20:101010110101001011102

Our target is to make the binary sequence as 11111111111111111111

To make all bits 1 by flipping exactly three bits per move

Consider 2 as an error and correct it by 1

So now the binary sequence is :101010110101001011111

Minimum moves =[total number of 0's/bits flipped per move]

=[11/3]=4

In move 1 flip bits at 1,3,5 positions

So the binary number will be 11111111010100101111

In move 2 flip bits at 9,11,13 positions

So the binary number will be 11111111111100101111

In move 3 flip bits at 15,17,18 positions

So the binary number will be 11111111111111111111

So the final move is to verify the additional moves are needed for remaining bits

By these following steps we can convert the given binary sequence to all 1's

7.Binary Palindromes

Given binary number:10110111012

Reverse the binary number:21011101101

So the binary number is not a palindrome because the reverse number does not match the original

Assume 2 is mistake in position 10 and correct it by 1

Now the binary number will be 10110111011

Minimum number of bit flips required to make the binary number as palindrome is:3

Flip bit at position 6(1→0)

Flip bit at position 8(0→1)

Flip bit at position 9 (1→0)

Transformed number:10110101101

Reverse of the transformed number:10110101101

Both transformed number and reverse of the transformed number are same .so the transformed number is a palindrome

8.Complex Binary Patterns

There are so many binary numbers with 10-bit binary numbers that contain exactly four 1s.

10 of the binary numbers with their decimal form:

1) 0000111100 = 60

2) 0000111010 = 58

3) 0000110101 = 53

4) 0000110011 = 51

5) 0000101110 = 46

6) 0000101101 = 45

7) 0000101011 = 43

8) 0000100111 = 39

9) 0000011110 = 30

10) 0000011101 = 29

9.Binary XOR Pairs with Constraints

Converting binary to decimal:

1010102→42

0110112→27

1101002→52

0011012→13

1001102→38

1111112→63

0000002→0

XOR(42, 27) = 47 ; XOR(42, 52) = 6 ; XOR(42, 13) = 35 ; XOR(42, 38) = 8 ; XOR(42, 63) = 29 ; XOR(42, 0) = 42 ; XOR(27, 52) = 45 ; XOR(27, 13) = 16 ; XOR(27, 38) = 47 ; XOR(27, 63) = 36 ; XOR(27, 0) = 27 ; XOR(52, 13) = 59 ; XOR(52, 38) = 24 ; XOR(52, 63) = 17 ; XOR(52, 0) = 52 ; XOR(13, 38) = 33 ; XOR(13, 63) = 50 ; XOR(13, 0) = 13 ; XOR(38, 63) = 21 ; XOR(38, 0) = 38 ; XOR(63, 0) = 63

So the pairs that maximize the XOR result and does not have more than three consecutive '1's in their binary representation are(42,27) and (27,38) with XOR result 47.

10.Binary Multiples and Remainders

Converting binary number to decimal number:

1101010=64+32+0+8+0+2+0

=106

Check weather 106 is divisible by 7:

106/7=15 and with remainder of 1

As 106 mod 7 is 1

106 is not a multiple of 7

Multiply the decimal number by 5

106*5=530

So the final result is 530.