

## awoo's blog

### Educational Codeforces Round 153 Editorial

By [awoo](#), [history](#), 17 months ago, translation, 

#### 1860A - Not a Substring

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution \(Neon\)](#)

#### 1860B - Fancy Coins

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution 1 \(BledDest\)](#)
- ▶ [Solution 2 \(BledDest\)](#)

#### 1860C - Game on Permutation

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution \(Neon\)](#)

#### 1860D - Balanced String

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution \(Neon\)](#)

#### 1860E - Fast Travel Text Editor

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution \(awoo\)](#)

#### 1860F - Evaluate RBS

Idea: [BledDest](#)

- ▶ [Tutorial](#)
- ▶ [Solution \(awoo\)](#)

 Tutorial of Educational Codeforces Round 153 (Rated for Div. 2)

 +125 

 [awoo](#)

 17 months ago

 55



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17 months ago, <#> |

← Rev. 2

 +10 



[Why\\_so\\_ez](#)

Pardon me if this is a stupid question, In problem D, after dp is used, the editorial says the answer is in the  $dp[n][cnt0][need]$ , why can't "need" also be equal to just  $cnt0 * cnt1$  instead of  $(cnt0 * cnt1 / 2)$  because in 00011 its balanced and the number of 01 subsequences is  $cnt0 * cnt1$  so should'nt we also check  $dp[n][cnt0][cnt0 * cnt1]$ . Thanks

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By [aryanc403](#)

Before stream 00:03:38

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17 months ago, # ▲ |

+8

00011 is not balanced there are 6 subsequences of 01 but 0 subsequence of 10

[→ Reply](#)**Ryehl**

17 months ago, # ▲ |

0

ah fudge thanks a lot for answering

[→ Reply](#)**Why\_so\_ez**

17 months ago, # ▲ |

0

00011 is not balanced unless you mean one of the resulting string after swap(s) is balanced. For example: 01010. In that case, the count of 01 & 10 is 3 which is equal to  $3^*2/2$ .

[→ Reply](#)

17 months ago, # |

+6

In problem C, I used the approach of maximum increasing subsequence. If Alice puts the chip on ith number, BOB, in the next turn, will put it to the second smallest number in maximum increasing subsequence, and then Alice has to move to the smallest number in the next turn which makes BOB the winner.

so Alice can only win if the size of the maximum increasing subsequence is 1 till the ith number. so that bob has to move the chip to the smallest number and Alice wins.

I got the wrong answer on test case 2. Please help me to know why this approach did not work. Thanks in advance.

[→ Reply](#)

17 months ago, # ▲ |

0

Alice will not win if the length is 1, She'll only put the coin in first move on the i th element. Now Bob won't have anywhere to move that coin to, So Bob wins. Alice only wins if the length of the maximum increasing subsequence ending at ith element has the length 2 : she puts the coin on ith element, then Bob has to move it to the remaining 1 element, then Alice won't have any moves to make further.

[→ Reply](#)

7 months ago, # ▲ |

0

Your text to link here... I also used the approach of maximum increasing subsequence. And I use stack and array q to store the length of maximum increasing subsequence.I think when the length is 2,Alice will win the game.But I got the wrong answer on test case 2. Please help me to know why this approach did not work. Thanks in advance.

[→ Reply](#)

17 months ago, # ▲ |

0

Lets take an example:

```
arr = [1, 2, 3, 4]
Expected Answer: 1
Your Answer: 2
```

According to your solution position with value 2 and 4 will be lucky.

But if you see for the value 4, Bob will make a move to 2, Then Alice is forced to make a move to 1, and Bob can't make a move now. So Bob wins.

[→ Reply](#)

17 months ago, # |

[← Rev. 2](#)

-15

It is now obvios that this round had a problem with tests for task D. They were weak, tons of wrong greedy solutions got accepted and then hacked. Only an idiot would consider tests of such a quality normal. This is **not okay**, and I think the least authors owe to contestants is an apology for their sloppy work. Things like this should not be allowed by the community.

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smalyarovsky

P.S.: Dear **BledDest**, I'm asking, I'm begging on my knees: please, don't make other posts about how wrong being toxic is. Because, as we've seen yesterday, sometimes if the author spends too much time fighting with toxicity in the community, he may not have enough time left to develop good tests for his problems.

P.P.S.: Don't mean to offend anybody. Make love, not crappy tests.

→ [Reply](#)



blitztage

17 months ago, # ▲ |

-32

"Greedy makes man blind and foolish, and makes him an easy prey for death."

-Rumi

→ [Reply](#)



transfermarket

17 months ago, # ▲ |

← Rev. 2 ▲ -38

If the test were strong, you can just spamming greedy solution without proving it.

P/S: FST==Skill issue



smalyarovsky

P/s: **BledDest** don't listen to the idiot who can't prove his solution because of his skill issue and then blamming you for FST. Your contest is awesome.

→ [Reply](#)

17 months ago, # ▲ |

← Rev. 2 ▲ -12

Maybe then we should remove all the tests? To assure nobody will send a solution without proving? Moron, submitting without a strong prove is a common thing in competitive programming, **exactly** because there are *tests* to tell if solution is right or wrong! And btw remind me, what harm is in someone spamming wrong greedy solution, getting a WA verdict and receiving extra penalty?

→ [Reply](#)

17 months ago, # ▲ |

-10



metal\_knight



imgflip.com

→ [Reply](#)



chu65536

17 months ago, # ▲ |

+32

This man speaks facts.

What is the point of tests if they accept *ideologically* wrong solutions? More than 20% of solutions were hacked right after the contest. Need to pretend that everything is okay and not pay attention to it?

→ [Reply](#)

16 months ago, # ▲ |

▲ 0

OMG Lucy in cyberpunk O.o



[→ Reply](#)

i\_love\_turtles

17 months ago, # |

← Rev. 2

+28

There is also a  $O(n^4/\omega)$  approach for D:

Let's say the imbalance score of a string is the difference between the number of 01 and 10 sequences. Then the desired string should have an imbalance score of 0. There are two observations:

1. You will never operate on a position twice, and you will never operate on two zeros or ones.
2. By swapping a pair of 0 and 1 at position  $(p, q)$ , the imbalance score increases/decreases by  $2 \times (p - q)$ , no matter what substring is between the pair.



szdytom

So you can calculate the imbalance score of the initial string and then do a backpack with bitset. In detail, let  $S_0$  denote the set of positions where there are 0s initially, and  $S_1$  the set of positions where there are 1s initially, and  $d$  to be imbalance score of the initial string.

By observation 2, the task is now transformed into this: find the minimal  $k$  such that you can select exactly  $k$  numbers from each of  $S_0$  and  $S_1$ , so that the sum of the  $k$  numbers selected from  $S_0$  is exactly  $d/2$  greater than the sum of the  $k$  numbers selected from  $S_1$ .

<https://codeforces.com/contest/1860/submission/219317671>

[→ Reply](#)

kookeudas

17 months ago, # ▲ |

+0

but, why is it always minimum count of exchanges that 0 and 1 in order if (count of 01) > (count of 10)?

[→ Reply](#)

IceNagisa

16 months ago, # ▲ |

+0

I think it's  $O(n^4/\omega)$  though much faster than std

[→ Reply](#)

szdytom

16 months ago, # ▲ |

+3

You are correct, I've just updated the comment.

[→ Reply](#)

kunalsrv20

16 months ago, # ▲ |

+0

Hey, can you elaborate more about "backpack with bitset"? Is it some technique? Any useful link will be appreciated !!

[→ Reply](#)

szdytom

16 months ago, # ▲ |

+0

1854B - Earn or Unlock uses this trick.

[→ Reply](#)

B.i.b.e.r

17 months ago, # |

+8

It is stored in  $dp(n, cnt0, need)$ , where  $cnt0$  is equal to the number of characters 0 in the string  $s$ , and  $need = cnt0 - cnt12$  (because the number of subsequences 01 should be equal to the number of subsequences 10). But our dynamic programming stores the number of changes in the string, and the problem asks for the minimum number of swaps. However, we can easily get it from the dp value. Since the amounts of zeroes and ones are fixed in the string, then the number of changes from 0 to 1 equals to the number of changes from 1 to 0 and we can pair them up. So, the answer to the problem is the half of the dp value.

Can anyone explain me how  $need$  is equal to  $c0*c1$  also how storing string changes helps in calculating answer? Please

[→ Reply](#)



trgt 26

17 months ago, # | ▲ 0 ▼

In problem C, How is it solved using Binary Indexed Tree or Segment tree? What is the logic?

→ [Reply](#)

trgt26

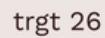


i\_m\_swachha

17 months ago, # ▲ | ▲ 0 ▼

Segment tree or BIT was used to calculate the "Longest Increasing Subsequence" size from 1 to index i for all i from 1 to n.

→ [Reply](#)



trgt 26

17 months ago, # ▲ | ▲ 0 ▼

<https://codeforces.com/contest/1860/submission/219290618>

Is this code calculating "Longest Increasing Subsequence"?

→ [Reply](#)

trgt26



i\_m\_swachha

17 months ago, # ▲ | ▲ 0 ▼

The code is checking if the size of the "LIS" is 2 from index 1 to index i if we must take the i'th element. But it is not calculating the actual size.

→ [Reply](#)



konahamaru

17 months ago, # | ▲ +1 ▼

What can be the best complexity in problem C, if we would allow repetitions in the array?

→ [Reply](#)



people\_plus\_plus

17 months ago, # ▲ | ▲ 0 ▼

But the solution will be the same

→ [Reply](#)



Rafi

17 months ago, # | ▲ +8 ▼

In problem D, Is there any way to solve it with recursive dp?

→ [Reply](#)



metal\_knight

17 months ago, # ▲ | ▲ +11 ▼

Yes: 219363424

→ [Reply](#)



mihleonid

17 months ago, # ▲ | ▲ +3 ▼

There is alternative solution with recursive dp. In my opinion, it is harder (but possible) to proof that it is not TL (Time Limit) exceeding solution.

219620926

→ [Reply](#)



metal\_knight

17 months ago, # ▲ | ▲ +3 ▼

The complexity of recursive DP is  $O(n^4)$ . But there won't be more than  $100 \times 100 \times 5000(c_0 \times c_1 \times d)$  states. Actually it is even smaller than that, because  $c_0 + c_1 \leq 100$ . Plus the time limit was 2 seconds and there was no multiple test cases.

→ [Reply](#)



17 months ago, # | ▲ +32 ▼

The rotating sweep line intuition in F is cumbersome and not so easy to think about. I find the following way to be more easy and intuitive (Well, they are equivalent, but I don't like rotating sweeplines).



**LeoPro**

Sorting pairs  $(a, b)$  by  $ax + by$  is the same as sorting pairs by  $a + b \cdot \frac{y}{x}$ . Now you can replace  $\frac{y}{x}$  with any positive real  $t > 0$ , and you sort pairs by  $a + b \cdot t$ . From now it's obvious, that initially you arrange the pairs lexicographically ( $t = +\varepsilon$ ), and then gradually increase  $t$ , the pairs that are swapped are of kind  $(a_1, b_1)$  and  $(a_2, b_2)$ , where  $a_1 < a_2, b_1 > b_2$  (and the swap is performed for  $t = \frac{a_2 - a_1}{b_1 - b_2}$ ).

→ [Reply](#)

17 months ago, # 1

+1

Finally new Color(CM).



**manitianajay45**

Video Editorial for Problem D,E:-

<https://youtu.be/khVG1JPdR1o>

Video Editorial for Problem A,B,C:-

<https://youtu.be/wZF5qfvBhuM>

→ [Reply](#)

16 months ago, # 1

+3

Explanation for those who are confused in Problem E why the author has not constructed a transposed graph to find out the distance from f -> s :

Let say we are connecting an edge of weight 1 when we are going from dummy node to an index node and an edge of weight 0 from index node to dummy node. When we are finding shortest distance from dummy node to index node then bfs on the normal graph will work. It is obvious.

But when we are finding shortest distance from index node to dummy node then we should apply bfs from the index node. But we can't do that as it will result in  $O(n^2)$  complexity. Alternative is that we can apply bfs from dummy node in the transposed graph and find the shortest path for each index node. So the complexity is now reduced.



**aditya\_108**

But it is not necessary to construct the transposed graph. Edges between index nodes are already bidirectional. In transposed graph, from dummy to index we will have an edge weight of 0 now . In the original graph, we are getting an extra edge weight as from dummy to index we are traversing via edge weight 1 and rest all edges in path have the same effect.

So we can use the original distance and reduce it by 1.

Hope it helps !!

→ [Reply](#)

15 months ago, # 1

0

**BledDest** Sorry for necroposting. For Problem F, I would like make a clarification to the problem statement by asking what the expected output is given the following test case:



**-1e11**

```
1
4
4 1 )
3 2 (
2 3 (
1 4 )
```

According to the second paragraph of your problem statement, we may choose  $(x, y) = (1, 1)$  so all the  $a_i \cdot x + b_i \cdot y$  are 5 and place them in  $(\text{()})$  since it's a tie. However, the sample solution written by **awoo** above outputs  $\text{NO}$  instead.

Thanks a lot!

→ [Reply](#)

15 months ago, # ▲ 1

+20

This test case is given in incorrect format. There are  $2n$  points in the problem, not  $n$ , so the number in the second line should be 2.





If you change it to 2, then the model solution says YES.

→ [Reply](#)



15 months ago, # ▲ |

0

Thanks for your replying and sorry for making such a stupid mistake...

→ [Reply](#)

-1e11

13 months ago, # ▲ |

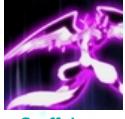
0

1860C - Game on Permutation

▶ Hint1

▶ Hint2

▶ Tutorial



Submission : 237228234

→ [Reply](#)



5 months ago, # ▲ |

0

C was just an application of the classic LIS problem.

→ [Reply](#)

Xiao\_2710

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