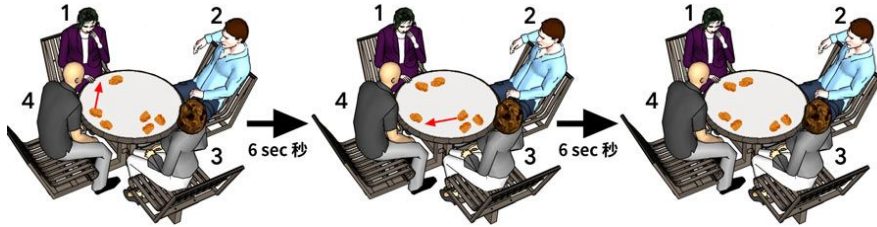


S181 - Odd is Odd

Percy Wong {percywtc}



The Problem



4 6 9	12
1 0 3 2	

3 3 2	-1
2 3 4	

6 2 3	6
1 4 1 5 9 2	

Need **C** secs to move one to its left.
Need **D** secs to move one to its right.

SUBTASKS

For all cases:

$$2 \leq N \leq 10^5$$

$$0 \leq A_i \leq 18$$

$$1 \leq C, D \leq 10^4$$

	Points	Constraints
1	14	$N = 3$
2	16	Exactly two integers in A_i are odd.
3	13	All A_i are odd.
4	24	$2 \leq N \leq 1000$
5	33	No additional constraints.

Background

Problem Idea By - percywtc

Testdata By - percywtc; microtony

Initial version is not cyclic but linear, which should be slightly easier



Statistics

0 points	$17 + 0 + 0 + 0 = 17$
13 points	$5 + 0 + 0 + 0 = 5$
14 points	$3 + 2 + 0 + 0 = 5$
27 points	$0 + 1 + 0 + 0 = 1$
30 points	$2 + 3 + 0 + 0 = 5$
43 points	$14 + 8 + 2 + 0 = 24$
67 points	$1 + 0 + 0 + 0 = 1$
100 points	$2 + 7 + 12 + 8 = 29$

First solved by **dbsgame** at **9m 18s**

SUBTASKS

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	Points	Constraints
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Solution 1 - The First Subtask

14 points for just handling $N = 3$

We can notice that it is impossible only when there are **1** or **3** odd numbers

If there are no odd numbers, the answer is simply **0**

Otherwise, the 2 odd numbers must be sitting next to each other,

Therefore the answer must be **$\min(C, D)$**

Solution 1 - The First Subtask

This solution can only solve Subtask 1, nothing else :)

Subtask	Score	Max Score
1	14	14
2	0	16
3	0	13
4	0	24
5	0	33
Total	14	100

Solution 1 - The First Subtask

PSEUDOCODE

```
ReadLine(N, C, D)
ReadLine(x, y, z)
If ((x + y + z) % 2 = 0)
    PrintLine(-1)
Else
    If (x % 2 = 1 OR y % 2 = 1)
        PrintLine(Min(C, D))
    Else
        PrintLine(0)
```

Solution 2 - The Second Subtask

16 points for just handling exactly **2** odd numbers

It is easy to see that the optimal solution must be moving one nugget from one person to the other

Here, we must use the shorter distance between them,
And the direction based on which is smaller between **C** and **D**

Therefore, the answer is **mindist * min(C, D)**

Solution 2 - The Second Subtask

This solution can only solve Subtask 2, nothing else :)

Subtask	Score	Max Score
1	0	14
2	16	16
3	0	13
4	0	24
5	0	33
Total	16	100

Solution 2 - The Second Subtask

PSEUDOCODE

```
ReadLine(N, C, D)
For i = 1 .. N
  Read(x)
  If (x % 2 = 1)
    If (PosA = NULL)
      PosA = i
    Else
      PosB = i
PrintLine(Min(PosB - PosA, N - PosB + PosA) * Min(C, D))
```

Solution 3 - The Third Subtask

13 points for just handling all odd numbers

When **N** is odd, meaning that it is impossible

When **N** is even, everyone having odd number of nuggets,

We can just pair up them with their neighbours, and then move one to other

Therefore, the answer will be $(N / 2) * \text{Min}(C, D)$

Solution 3 - The Third Subtask

This solution can only solve Subtask 3, nothing else :)

Subtask	Score	Max Score
1	0	14
2	0	16
3	13	13
4	0	24
5	0	33
Total	13	100

Solution 3 - The Third Subtask

PSEUDOCODE

```
ReadLine(N, C, D)
If (N % 2 = 0)
    PrintLine((N / 2) * Min(C, D))
Else
    PrintLine(-1)
```



Solutions Summary

Solutions		1 - 1 st Sub	2 - 2 nd Sub	3 - 3 rd Sub
Subtask	Max Score	Score		
1	14	14	0	0
2	16	0	16	0
3	13	0	0	13
4	24	0	0	0
5	33	0	0	0
Total	100	14	16	13



Score
14
16
13
0
0
43

Solution 4 - The Full Solution

First, we can notice that only positions with odd nuggets are important

We always want to pass a nugget from one to another

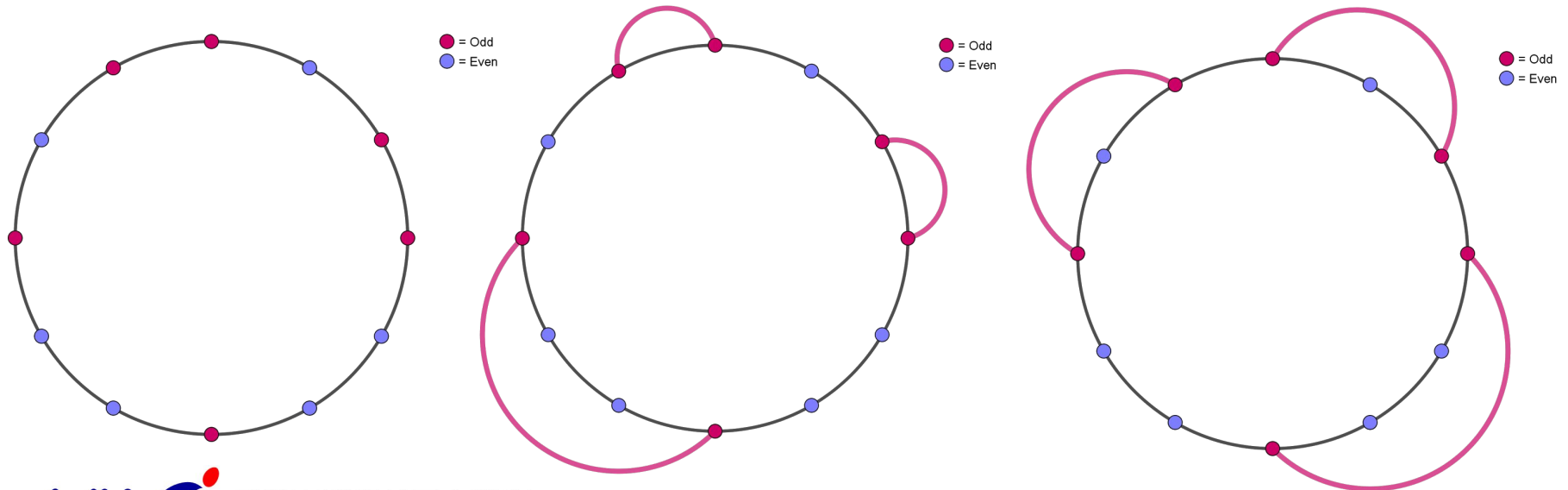
Also, we can notice that the direction is not important,

We can simply choose it based on which is minimum between **C** and **D**

So now we know that for two selected position, the cost of moving one to other must be **dist * Min(C, D)**

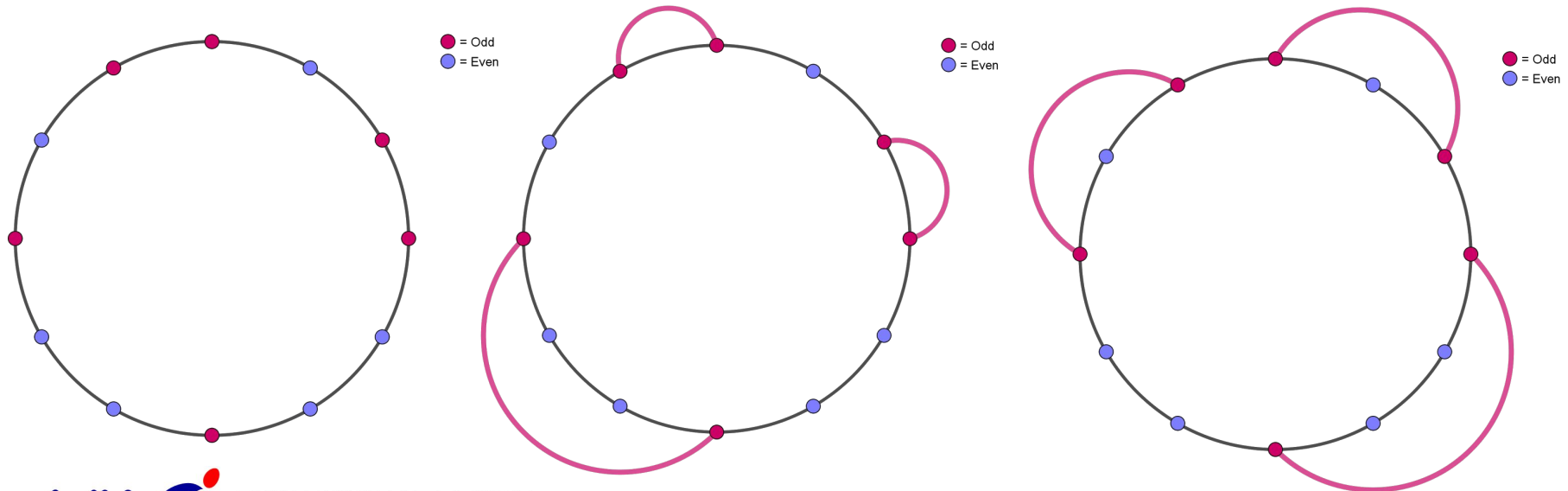
Solution 4 - The Full Solution

If there are “odd number” of odd numbers, i.e. sum is odd,
The answer is impossible, otherwise, we should pair up them to find solution



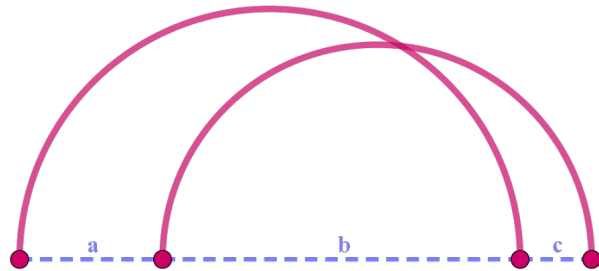
Solution 4 - The Full Solution

Notice that we must find non-overlapping pairing way
The optimal solution must be one of the following two:

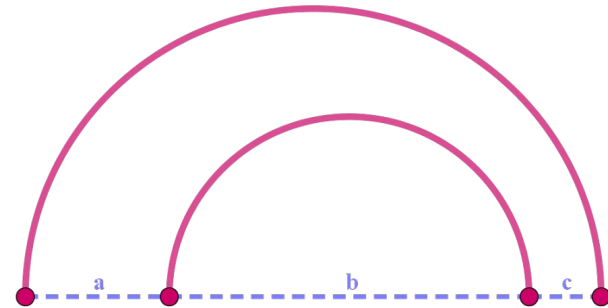


Solution 4 - The Full Solution

Here is briefly why we won't consider overlapping pairing way



$$(a + b) + (b + c) > a + c$$



$$(a + b + c) + (b) > a + c$$



Solution 4 - The Full Solution

Subtask	Score	Max Score
1	14	14
2	16	16
3	13	13
4	24	24
5	33	33
Total	100	100