# Unbxd Problem Set 6

## Introduction

Dear Candidate,

Please find the two questions that you'll be tested on in this document. The questions are not numbered sequentially. Please note that you'll be tested on two parameters:

a. Correctness
b. Algorithmic efficiency

When you submit your solutions, if your code is spread across multiple files, please provide the appropriate makefiles or build scripts that will run on a standard Linux distribution. Please zip or tar the files in case you're submitting multiple files.

You may code the solutions in any language although the in-person round will take into account your knowledge of Java or how quickly you'll be able to grasp a new language.

Although we're not timing you on this test, we recommend that you submit the solutions as soon as possible since the turn around time of the solutions across candidates will be factored into the screening decision.

Good luck!

-Unbxd Team

## Q3. Election

**Problem**
Party CORRUPT wants to win the election by bribing. The party doesn't have to bribe every person as people belonging to a group are related. For example, bribing one of the young couple will automatically get the vote from the other one.

The voters are lined up and are numbered 0 to N-1 from left to right. Each voters have two attributes - influence and resist. Resistance of value less than zero will cause the voter to vote for the party CORRUPT. If the party CORRUPT bribes the ith person in line, then that person resistance will be reduced by influence[i]. Since the person bribed influences the rest, the resistance of the person on immediate left and right is reduced by influence[i]/2 (i.e the resistance of i-1th and i+1th person falls by influence[i]/2). The resistances of the (i-2)-th and (i+2)-th people will be reduced by influence[i]/4, and so on. The ith person bribed reduces the resistance of kth person by influence[i]/2^(abs(i-k)), where abs(i-k) is the absolute value of i-k.

To win the election party CORRUPT should get positive vote from all the voters. What is the mininum number of person to be bribed to win the election. A single voter can't be bribed more than once.If impossible return -1.

**Constraints**

- influence and resistance will each contain equal number of elements and elements between 1 and 50 in numbers..
- Each element of influence and resistance will be between 1 and 500, inclusive.

**Examples**

**A)**

{ 10, 3, 5, 3, 1 }
{ 11, 2, 7, 3, 1 }
Returns: 2
The influence can be less than, equal or greater than the resistance of a given person. Here the optimal strategy is to bribe the people with indices 0 and 2, decreasing the resistances of the people by {10, 5, 2, 1, 0} and {1, 2, 5, 2, 1}, respectively, making the final resistances {0, -5, 0, 0, 0}.

**B)**

{ 15, 15, 15 }
{ 13, 42, 13 }
Returns: -1
This one is impossible. Even when bribing all of them, the final resistance is {-12, 13, -12}. The cake is a lie.

**C)**

{ 10, 16, 4, 7, 1, 1, 13 }
{ 10, 16, 4, 7, 1, 1, 13 }
Returns: 4
After bribing the people with influence 16, 13, and 10, only one person remains with barely positive resistance. She still has to bribe that one person to have full support and win the election.

**D)**

{ 479, 340, 398, 40, 477, 181, 422, 377, 60, 486, 15, 500, 307, 1, 2, 65, 411, 374, 446, 401 }
{ 402, 87, 20, 76, 468, 493, 252, 98, 216, 58, 89, 500, 89, 26, 8, 125, 269, 116, 426, 81 }
Returns: 7

**E)**

{ 21, 196, 401, 157, 9, 497, 371, 84, 395, 495, 401, 190, 465, 359, 47, 441, 245, 487, 118, 405 }
{ 127, 313, 376, 94, 66, 37, 237, 142, 315, 495, 257, 153, 437, 339, 483, 356, 16, 132, 231,

342 }
Returns: 8

## Q1. Letter Delivery problem

**Problem**
You have to deliver several letters along a street. You have the address (in the form of the number of meters from the left end of the street to the destination of the letter) and the maximum time you can take to deliver each letter. Your cab mover at 1 meter per second and can deliver a letter instantly once you reach the right location. You need to find out if it's possible to make all the deliveries within the given constraints, and if so, the minimum time you need to take to do it.

You will be given two int arrays, **location** and **maximumTime**, where the ith element of each represents the address and maximum time of delivery of the ith letter. You will also be given an int **initialPos** with the initial position . Return the minimum amount of time you need to deliver all letters within the constraints or -1 if it's impossible to do so.

**Constraints**

| | |
|---|---|
| - | **location will contain between 1 and 50 elements, inclusive.** |
| - | **location and maximumTime will contain the same number of elements.** |
| - | **Each element of location will be between 1 and 1000000 , inclusive.** |
| - | **Each element of maximumTime will be between 1 and 1000000000 , inclusive.** |
| - | **initialPos will be between 1 and 1000000 (106), inclusive** |

**Examples**
**A)** {1,3,5,7}
{9,2,5,100}
4
Returns: 13

The only way to deliver all the letters within the maximum times is to go through all the houses in the following order: 3-5-1-7

**B)** {1,5}
{6,2}
3
Returns: 6
If the you start from the house with address 5, you will make both just in time.