Seven Lakes HS Kickoff 2024

Keep Tony Allve

Table of Contents

THE Football

Problem: After winning the state championship (in football), Tony was given the grand prize of THE football. You will not be given an input, just print out the image of THE football.

Input: N/A

Output: Output the following image

Sample Input: N/A

Sample Output:

```
...................................................................
...................................................................
...................................................................
...................................:::--------::::.................
.............................:-+#%##%%%%#%=::=####%%*-:............
..........................-+#####%###*%#+%##=:--######*:...........
.......................-+########%#*%#*##%####-..+#####=...........
.....................-*#######%%*+##*##########+:--####=...........
...................-#####%##%%+#*##*############*:.:###=...........
..................+####%*#%#+##%***###############..-##-...........
................:####%#%%%=###*####################..=+............
...............-%###%#%#+*#########################*:-:............
..............----%###%#%#*#########################+-.............
.............:-...:+%##%%%##########################=..............
.............*#-.:=::*############################@-...............
............=###%+....+#########################%%:................
...........:+#####*:...-#######################%*:.................
...........-########=...:###################%%#-...................
...........-#########=....*##############%%%*-.....................
...........=%#########=...:*##########%%%#=:.......................
...........:*%#########-...:*###%%%%%%+-:..........................
.............-*%%%%%%%%%%%%%%%%%%*=-:..............................
................:--=======---::....................................
...................................................................
...................................................................
...................................................................
```

In Bounds?

Problem: In article V, section I, paragraph III of the Seven Lakes Beginner's guide to football, lies the following quote: "A very important tip when playing football is to stay in bounds. Going out of bounds is not very good." Your task is to find if 2 strings satisfy this supreme law of the land. Find out if a string T is in(bounds) another string S ignoring case. In other words, check if T is a substring of S ignoring the case.

Input: The only line contains 2 strings, T and S.
($1 \leqslant |S|, |T| \leqslant 100$). Read input from **inbounds.txt**

Output: Output YES if T is inside S and NO if not.

Sample Input 1:
Foot fOOtball

Sample Output 1:
YES

Sample Explanation 1:
Foot is inside **fOOt**ball ignoring case

Sample Input 2:
VICTOR startinGQB

Sample Output 2:
NO

Sample Explanation 2:
VICTOR is not in startinGQB

Drawing the Border

Problem: Coach Johnson's room needs to be refurbished. As a result, he has enlisted you to choose a new painting to decorate the room. You have already chosen the painting, but now you need to create a border to hang it on the wall. The original painting will consist of dots (.) and underscores (_).

Print out the new painting after adding a border of width W made up of #s.

Input: The first line of input contains T, the number of test cases ($1 \leqslant T \leqslant 100$)
The first line of each test case contains N ($1 \leqslant N \leqslant 1000$), M ($1 \leqslant M \leqslant 1000$), and W ($1 \leqslant W \leqslant 100$), the number of rows and columns of the original painting and the width of the border. The next N lines of the test case will each contain M characters, denoting the original painting. Read input from **drawingtheborder.txt**

Output: Output the new painting with a border of width W made up of #s.

Sample Input:

```
2
2 5 1
._...
____.
5 4 2
....
____
.__.
_.._
....
```

Sample output on the next page →

Sample Output:

```
#######
#._...#
#____.#
#######
########
########
##....##
##____##
##.__.##
##_.._##
##....##
########
########
```

Hail Mary

Problem: There’s 5 seconds on the clock. Coach Johnson has decided to use his last resort: the coveted Hail Mary play. Tony will throw the ball as far as he can (46 yards), and if the ball can reach Fikky the receiver, then his team will win. Otherwise, they will lose. Determine if his team wins!

Remember:

$$distance = \sqrt{(x_1 - x_0)^2 + (y_1 - y_0)^2}$$

Input: The first line of input contains T, the number of test cases ($1 \leqslant T \leqslant 100$)
The first line of each test case contains H_1 ($1 \leqslant H_1 \leqslant 53$), V_1 ($1 \leqslant V_1 \leqslant 120$), H_2 ($1 \leqslant H_2 \leqslant 53$), and V_2 ($1 \leqslant V_2 \leqslant 120$) denoting Tony’s horizontal and vertical position on the field and Fikky’s horizontal and vertical position on the field. Note that the length of a field is 120 yards including 10 yards for each end zone. Read input from **hailmary.txt**

Output: Output “Spartans Win!” without quotes if his furthest possible throw can reach Fikky or “Spartans Lose :(” if he cannot reach it.

Sample Input:

```
3
20 40 30 8
35 70 2 120
42 90 50 51
```

Sample Output:

```
Spartans Win!
Spartans Lose :(
Spartans Win!
```

Touchdown !!

Problem: Tony has finally made it to the field on game day and needs to score a touchdown to prove his worth. Unfortunately, he's been distracted by a few side quests. First of all, there will be coins on the field that Tony needs to collect before the touchdown actually counts. Additionally, there are teleporters on the field that will send him straight back to his starting position instantly if he steps on them. Finally, there exists 1 speed boost on the grid that will double Tony's movement speed permanently once he steps on it. Given that Tony moves 1 tile per second before the boost and 2 tiles per second after, find the minimum number of seconds until Tony makes the touchdown. The grid will be made up of the following characters:

"G" - A cell that Tony can run to
"#" - An opponent player, Tony cannot run to this square
"S" - Tony's starting position
"E" - The end point Tony has to get to
"T" - A teleporter that will send Tony back to the start position
"C" - A coin
"B" - The speed boost

Input: The first line contains an integer T, the number of test cases ($1 \leqslant T \leqslant 10$)
For each test case:
The first line contains 2 space separated integers, N and M, the number of rows and columns ($2 \leqslant N, M \leqslant 100$).
The next N lines contain M characters, denoting the field. Read input from **touchdown.txt**
There will be at most 8 coins on the field. There will be exactly 1 speed boost on the field.

Output: Output T lines, the ith line containing the number of seconds it will take before Tony makes a touchdown. If Tony cannot make the touchdown under any circumstances, print "Get benched." without quotations.

Sample Input:

```
3
4 4
S###
GBGC
EGGT
####
2 3
S#B
#E#
1 3
SEB
```

Sample Output:

```
4.5
Get benched.
1.0
```

Sample Explanation:

In the first test case, Tony runs to the speed boost in 2 seconds, runs to the coin in 1 second, takes the teleport back in 0.5 seconds, and runs to the endzone in 1 second for a total of 4.5 seconds.
In the second test case, it can be shown Tony cannot reach the end.

Football v2

Problem: Football v2 is a game created by Tony because he can't play regular football. In Football v2, the ball will be black and white with an alternating hexagonal pentagonal pattern. The game will last N minutes and players have to use their feet to kick a ball into a goal (as the name implies). Seven Lakes wants to challenge an opponent team to a Football v2 match. Every minute in the match, a team will score. Seven Lakes will score points at every odd minute and the opponent team will score points at every even minute and each goal is worth a different number of points. Given the point values of each goal at each minute, find the positive difference between the scores of the 2 teams at the end of the match.

Input: The first line contains an integer T, the number of test cases. ($1 \leqslant T \leqslant 100$) For each test case: The first line contains an integer N, the number of minutes in the game. ($1 \leqslant N \leqslant 90$)
The second line contains N integers, p_i, representing how many points a goal is worth at the ith minute ($1 \leqslant p_i \leqslant 100$). Note that the input starts at the 1st minute. Read input from **footballv2.txt**

Output: Output the positive difference between the scores of the 2 teams.

Sample Input:
1
7
1 3 6 4 7 4 6

Sample Output:
9

Sample Explanation:
Seven Lakes score = 1 + 6 + 7 + 6 = 20
Opponent score = 3 + 4 + 4 = 11
Positive difference = |20 - 11| = 9

Running the Field

Problem: Victor, the wide receiver on the football team, needs to run the entire length of a football field in order to score a touchdown. The field can be represented as a string with N segments (with the first segment being segment 1 and the last segment being segment N), each with a length of 1 yard. Each segment is either empty (denoted as '.') or contains a defender i with strength a_i (denoted as 'D').

Victor starts with X energy and must spend a certain amount of energy for each segment he runs. If the segment is empty, he spends 1 energy, and if the segment contains defender i, he spends a_i energy.

Running the entire length of the field would take a lot of energy. Fortunately, the quarterback, Tony, can throw the ball to Victor so that he starts at a certain yardage (so he spends no energy running the previous yards). For example, if Tony throws 37 yards, Victor will start running at the beginning of the 38th segment (i.e he must run the 38th segment of the field).

Given the amount of energy Victor starts with, the field, and the strength of each defender, compute the minimum number of yards Tony must throw so that Victor can score a touchdown (by finishing segment N) without running out of energy (Victor runs out of energy if his energy is less than 0 after running the last segment).

Input: The 1st line contains an integer T, the number of test cases ($1 \leqslant T \leqslant 10^5$).

The 1st line of each test case contains 3 space separated integers, N, M, and X ($1 \leqslant N, X \leqslant 10^3$) ($0 \leqslant M \leqslant N$), the length of the field, the number of defenders, and the amount of energy Victor has respectively.

The 2nd line of each test case contains a string of length N, with the ith character of the string representing the ith segment of the field.

The last line of each test case contains M integers, denoting that the ith defender (with the 1st defender being the leftmost defender on the field) has a strength of a_i. Read input from **<u>runningthefield.txt</u>**

The sum of all N will not exceed 10^5

Output: Output one integer, the minimum amount of yards that Tony must throw so that Victor can score the touchdown without running out of energy.

Sample Input 1:

```
2
5 2 5
D..D.
1 2
5 2 1
D...D
1000 1000
```

Sample Output 1:

```
1
5
```

Sample Explanation 1:

For the first test case, if Tony throws 1 yard, Victor will start at the beginning of yard 2 and run yard 2(.), yard 3(.), yard 4(D with strength 2), and yard 5(.). Therefore, Victor will spend 1+1+2+1=5 energy, which is not more than the amount of energy he has.

For the second test case, Tony must throw all 5 yards so that Victor finishes the segment N without using any energy.

The Human Trapezoid

Problem: Taking inspiration from the human pyramid formation from the cheerleaders, the football team decided to unleash the most powerful offensive/defensive tactic known to man - the human trapezoid. The human trapezoid has X players at the bottom of the formation and Y players at the top of the formation and each row has 1 fewer player than the row below except for the bottom row. Unfortunately, the team only has N players right now. Find how many more people are needed, if any, to complete the human trapezoid so the sacred formation can be complete.

Input:
The first line contains an integer T, the number of test cases
$(1 \leqslant T \leqslant 1000)$
For each test case:
The first line contains 3 space separated integers, X, Y, and N.
$(1 \leqslant Y \leqslant X \leqslant 10^9)$ $(1 \leqslant N \leqslant 10^{18})$
Read input from **thehumantrapezoid.txt**

Output: Output the number of additional people needed to complete the human trapezoid.

Sample Input:
```
2
5 3 7
4 3 7
```

Sample Output:
```
5
0
```

Sample Explanation:
TC 1: The rows consist of 5, 4, and 3 for a total of 5+4+3=12 people. Since there are only 7 people right now, the team needs 12-7=5 people.

Secure the Playbook

Problem: Coach Johnson has recently gotten his computer hacked, so he created a new password to secure his playbook. He decided to encode his original password with a modified Atbash cipher. An atbash cipher is a cipher where each letter should be turned into the letter on the other end of the alphabet. For example ‘a’ maps to ‘z’, ‘b’ maps to ‘y’, ‘c’ maps to ‘x’, etc. The modification is that the case of the letter also switches. For example, ‘a’ maps to ‘Z’ and ‘A’ maps to ‘z’. Given Coach Johnson’s original password, find his new encoded password. He will leave all non alphabetic characters unchanged.

Input: The first line of input contains T, the number of test cases
$(1 \leqslant T \leqslant 100)$
The next T lines contains a string S, the original password
$(1 \leqslant |S| \leqslant 10^5)$

The sum of $|S|$ will not exceed 10^5 over all test cases
Read input from **securetheplaybook.txt**

Output: Output, for each test case, Coach Johnson’s modified password.

Sample Input:

```
3
aBcD
kRHGLO iZRM dRWV 200
GSV 10 OZAB ULCVH QFNKVW LEVI GSV JFRXP YILDM WLT!!>:(
```

Sample Output:

```
ZyXw
Pistol Rain Wide 200
the 10 lazy foxes jumped over the quick brown dog!!>:(
```

Naming Convention

Problem: Coach Johsnon has recently implemented new regulations for official roster names to ensure a uniform standard is met. The regulations are as follows:

- Neither the first nor last name cannot have two capital letters in a row
- First names must start with a capital letter
- The word “johnson” (in any capitalization case) cannot be a substring of either the first name nor last name
- The full name (first and last combined) cannot have more vowels (a,e,i,o,u) than consonants.
- There can be at most K players that share the same first name (capitalization matters and it is a first come first serve basis). Note that people who have to change their name don’t count here.

Given these conditions and a list of names of players that applied to be on the roster, determine if each name meets the conditions.

Input: The first line will contain N ($1 \leqslant N \leqslant 1000$), the number of players, and K ($1 \leqslant K \leqslant N$), the maximum number of players that can share the same first name. The next N lines will contain the names of the players. Read input from **namingconvention.txt**

Output: Output “{First Name} {Last Name} is a valid name” if his/her name meets the conditions or “{First Name} {Last Name} has to change his/her name” if it doesn’t.

Sample input and output on the next page →

Sample Input:
```
7 2
Fikky D
Oluwafikayo JohnsoN
Victor LLLLLLLLLLLLLLL
Fikky dosunmooooooo
Fikky dosunmu
Fikky Chen
tony Liu
```

Sample Output:
```
Fikky D is a valid name
Oluwafikayo JohnsoN has to change his/her name
Victor LLLLLLLLLLLLLLL has to change his/her name
Fikky dosunmooooooo has to change his/her name
Fikky dosunmu is a valid name
Fikky Chen has to change his/her name
tony Liu has to change his/her name
```

Field Painting

Problem: The key to a successful football match is a beautiful field. Contrary to popular belief, there should be no white on the field like most modern fields, just pure green. Coach Johnson must paint his field to accomplish this goal. Coach Johnson's field can be represented by an N by M grid where each cell is either green ("#") or white ("."). He can paint any 2×2 subgrid completely green in 1 operation. However, since paint is expensive, what is the minimum number of operations it takes to completely fill the grid with green?

Input: The first line contains an integer T, the number of test cases ($1 \leqslant T \leqslant 100$). For each test case: the first line contains 2 integers, N ($2 \leqslant N \leqslant 1000$) and M ($2 \leqslant M \leqslant 11$)
The following N lines contain M characters, '.' and '#' where '.' represents a white cell and '#' represents a green cell.

It is guaranteed that the sum of N will not exceed 1000 over all test cases. Read input from **fieldpainting.txt**

Output: Output the minimum number of operations it takes to paint the entire grid.

Sample Input:

```
1
4 4
.#.#
.#.#
#.#.
#.#.
```

Sample Output:

```
4
```

Sample Explanation:
Coach Johnson needs to paint a 2×2 in each of the 4 corners of the grid to completely fill the grid with green.

Uninvited

Problem: Alice, Tony, and Bob need to break past the Tompkins football defense. However, Coach Johnson forgot to invite one of them. How many ways could this have happened so that the sum of the skill levels of the people who were invited is still strong enough to break past the defense?

Input: The first line contains an integer T, the number of test cases ($1 \leqslant T \leqslant 10^5$)
Each test case contains 4 space separated integers on the first line, a, t, b, and d. v is Alice's skill level, t is Tony's skill level, b is Bob's skill level, and d is the skill threshold.
($1 \leqslant a, t, b, d \leqslant 100$). Read input from **uninvited.txt**

Output: Output T lines, the ith line containing the number of ways someone can be uninvited for the ith test case.

Sample Input:

```
3
1 2 3 4
1 3 5 7
1 1 1 4
```

Sample Output:

```
2
1
0
```

Sample Explanation:
In test case 1, Alice or Tony could stay behind giving 2 ways, $1+3 \geqslant 4$ and $2+3 \geqslant 4$.
In test case 2, Alice can stay behind giving 1 way, $3+5>7$.

Team Cuts

Problem: Coach Johnson is looking to cut some players from the team. Each player on the team has been lined up and assigned 1 letter. Since Coach Johnson wants his players to be one of a kind, if there exists more than 1 player on the team with the same letter, he picks 2 players who have been assigned that letter and cuts them from the team. After he finishes all the cuts, Coach Johnson goes left to right and writes down the letters of the players that are left. What is the minimum lexicographical string Coach Johnson could've written down? Note that the original order of the lineup must be preserved.

Input: The first line of input contains T ($1 \leqslant T \leqslant 100$), the number of test cases.
The first and only line of each test case contains the string S, the original lineup of the players. ($1 \leqslant |S| \leqslant 10^5$)
The sum of $|S|$ will not exceed 10^5 over all test cases. Read input from **teamcuts.txt**

Output: Output the smallest lexicographical string that can be obtained

Sample Input:

```
3
eaabbccddd
geeegfffgdadd
cdeddaeeb
```

Sample Output:

```
ed
efgad
cdaeb
```

Sample Explanation:
Test case 2: Coach Johnson cuts the first 2 gs, the first 2 es, the first 2 fs, and the first 2 ds, leaving efgad

Roster Typos

Problem: Seven Lakes High School has recently had some new football players transfer to the school. However, in order to officially add them onto the team, the coaches need a new roster list that contains each of these players as well as the old players. When typing up the new roster, Coach Johnson made some typos: some of the names of the original players have been misspelled. Thankfully, he has a copy of the original roster, and he wants to correct his typos. Correct the new roster list so that each name is correct. Print out the new roster in alphabetical order.
A typo occurs when Coach Johnson enters a letter to the one spot left or right of the intended letter in a QWERTY keyboard. If all the letters that he typed are at most one spot to the left or right of the intended letter, then Coach Johnson has misspelled a name and you will have to correct it for him.

Note: The QWERTY keyboard is built as follows:
Row 1: QWERTYUIOP
Row 2: ASDFGHJKL
Row 3: ZXCVBNM

Note: Coach Johnson made sure to double check the spellings of his new transfers, so they are guaranteed to not be typos of the original names.

Ex: KSMEA is considered a typo of JAMES because K is one spot to the right of J, S is one spot to the right of A, M and E are correct, and A is one spot to the left of S.

Input: The first line of input contains T ($1 \leqslant T \leqslant 100$), the number of test cases
The first line of each test case contains N ($1 \leqslant N \leqslant 1000$), the number of players on the original roster, and M ($N \leqslant M \leqslant 1000$), the number of players on the new roster.
The next line will contain N names separated by spaces, depicting the original roster, where every name is spelled correctly.

The next line will contain M names, that depict the new roster, where there could be some misspelled names. It is also guaranteed that no 2 players will have the same name. It is also guaranteed that there are no multiple solutions (there is only one possible new roster).
Note that the roster only contains first names (all uppercase letters) and no names will have spaces.
Read input from **rostertypos.txt**

Output: Output the new roster in alphabetical order with all the misspelled names corrected.

Sample Input:

```
2
3 4
ANTHONY DESHAUN DYLAN
DESHAUN SNTHIMU STLAN STOAM
4 6
FIKKY NOAH SHAAN TYRONE
AHASN BOSH DARREL DEION DIKKY TURIME
```

Sample Output:

```
ANTHONY DESHUAN DYLAN STOAM
DARREL DEION FIKKY NOAH SHAAN TYRONE
```

Tackled

Problem: As Tony runs towards the end zone, sweat running down his forehead and dreaming about scoring the game winning touchdown, he gets tackled. Furious, he swears to find the identity of the person who tackled him. This happens every game. Given the name of the player who tackled Tony, output the following sentence:
"ANTHONY LI TACKLED BY {player name in all uppercase}!!!!!"

Input: The first line contains an integer T, the number of test cases. The first and only line of each test case will contain the player name. Note: the player name does not necessarily have to be an actual name. Read input from **tackled.txt**

Output: Output the sentence for each test case.

Sample Input:

```
4
Victor liu
coach Johnson
FIKKY D
Anthony LI
```

Sample Output:

```
ANTHONY LI TACKLED BY VICTOR LIU!!!!!
ANTHONY LI TACKLED BY COACH JOHNSON!!!!!
ANTHONY LI TACKLED BY FIKKY D!!!!!
ANTHONY LI TACKLED BY ANTHONY LI!!!!!
```

Oklahoma Drills

Problem: It's time for Oklahoma Drills! Coach Johnson has split his team into two groups: offense and defense, and both have N players. When two players go head to head in the drill, the one with the higher power wins and retains its power; the other one loses and is out. If both have the same power, they both lose. The player that wins goes to the back of his line. Coach Johnson has already scouted each player on his team and determined their power. Help Coach Johnson find out if the offense wins or if the defense wins. Note: the front of the line in this case is the player at index 0.

Input: The first line of input contains T ($1 \leqslant T \leqslant 100$), the number of test cases
The first line of each test case contains N ($1 \leqslant N \leqslant 100$), the number of players on both offense and defense.
The next 2 lines each contain N integers, the powers of the offensive and defensive players respectively. Read input from **oklahomadrills.txt**

Output: Follow the format of the sample output.

Sample Input:

```
3
4
1 2 4 6
5 2 1 4
3
1 7 8
10 1 2
1
2
2
```

Sample Output:

```
Offense will win
Defense will win
There is no winner
```

Weakest Link

Problem: Coach Johnson has so many players he can't possibly represent them as single integers. Therefore, he has to give entire segments in the format $[l_i, r_i]$ to denote that on his team, there are players with numbers l_i, l_i+1, $l_i+2…,r_i$. He has N of these segments. Furthermore, he did not realize that some segments overlapped which would cause a single player to appear in multiple segments. If that happens, only count that player once. Each player has a skill level equal to their number. Inspired by the quote "your team is only as strong as your weakest link", Coach Johnson decides to make the weakest link at least X. To do this, he can train a player individually and double their skill level. How many training sessions does Coach Johnson need to conduct in order to ensure the weakest link is at least X? Please output the answer modulo 1000000007.

Input: The first line contains an integer T ($1 \leqslant T \leqslant 10^5$), the number of test cases
The first line of each test case contains 2 space separated integers, N ($1 \leqslant N \leqslant 10^5$), and X ($1 \leqslant X \leqslant 10^{18}$). The sum of N over all test cases will not exceed 10^5
The next N lines contain 2 space separated integers, l_i and r_i , the endpoints of the segments ($1 \leqslant l_i, r_i \leqslant 10^{18}$). Read input from **weakestlink.txt**

Output: Output the number of training sessions it takes modulo 1000000007.

Sample Input:
1
2 10
4 7
5 9

Sample Output:
7

Sample Explanation:
The starting skill levels for the segments are {4, 5, 6, 7} and {5, 6, 7, 8, 9}. The total set of skill levels is {4, 5, 6, 7, 8, 9}. The number of training sessions will be calculated as follows:
4 → 8 → 16 for 2 total
5 → 10 for 1 total
{6, 7, 8, 9} will all need 1 training session similarly for a total of 7 training sessions.

Bribery

Problem: There are 3 teams, Team Tony, Team Johnson, and Team Victor and N players that are on exactly one of these teams have been sent to live in a tree of N nodes. Every node contains exactly 1 player that is either on team Tony, Johnson, or Victor. In order to reduce conflict between the teams, a neutral observer, Fikky, must bribe some players to change teams. Conflict is minimized when any player on a team can reach any other player on the same team by traversing edges such that it does not visit any other players on other teams. Since bribing is expensive, find the minimum number of bribes it will take to minimize conflict in the tree. Note that in 1 bribe, Fikky can only change the team of 1 player.

Input: The first line contains an integer T ($1 \leqslant T \leqslant 1000$). For each test case: the first line contains 1 integer N ($1 \leqslant N \leqslant 10^5$), the number of nodes in the tree.
The second line contains a string S, consisting of “T”, “J”, or “V”, where the ith character denotes the starting team of the ith player.
The next line contains N-1 space separated integers, a_i ($a_i \leqslant i$), denoting the parent of the i+1th node. Read input from **bribery.txt**
The sum of N over all test cases will not exceed 10^5

Output: Output the minimum number of bribes it takes to minimize conflict.

Sample Input:
1
4
TTJJ
1 1 2

Sample Output:
1

Sample Explanation:
Fikky can bribe node 3 to become part of team Victor for 1 bribe.