1. **Least Substring**

https://www.lintcode.com/problem/least-substring/description

代码：

```
public class Solution {
    /**
     * @param s: the string s
     * @param k: the maximum length of substring
     * @return: return the least number of substring
     */
    public int getAns(String s, int k) {
        // Write your code here
        int n = s.length(), count = 1, ans = 1;
        for(int i = 1; i < n; i++) {
            if(count < k && s.charAt(i) == s. charAt(i - 1)) {
                count++;
            } else {
                ans++;
                count = 1;
            }
        }
        return ans;
    }
}
```

1. **K-Substring with exactly K different characters(长度为 K，有 K 个不同)**

https://www.lintcode.com/problem/k-substring-with-k-different-characters/description?_from=ladder&&fromId=69

https://www.jiuzhang.com/solution/k-substring-with-k-different-characters/

https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=485608&extra=page%3D3%26filter%3Dauthor%26orderby%3Ddateline%26sortid%3D192%26sortid%3D192%26orderby%3Ddateline

注意审题，可能有变种

双指针，O(n)复杂度

```
    public int KSubstring(String stringIn, int K) {
        if (stringIn == null || stringIn.length() == 0 || K <= 0) {
            return 0;
        }
        int count = 0;
        HashMap<Character, Integer> charMap = new HashMap<>();
        HashSet<String> resultSet = new HashSet<String>();
        int len = stringIn.length();
```

```
    int j = 0;
    for (int i = 0; i < len; i++) {
      while (j < len && charMap.size() < K) {
        char c = stringIn.charAt(j);
        if (charMap.containsKey(c)) {
          break;
        }
        charMap.put(c, 1);
        j++;
        if (charMap.size() == K) {
          resultSet.add(stringIn.substring(i, j));
        }
      }
      charMap.remove(stringIn.charAt(i));
    }
    return resultSet.size();
  }
```

1. **TODO: Return all the substring with K characters contain K-1 distinct characters**

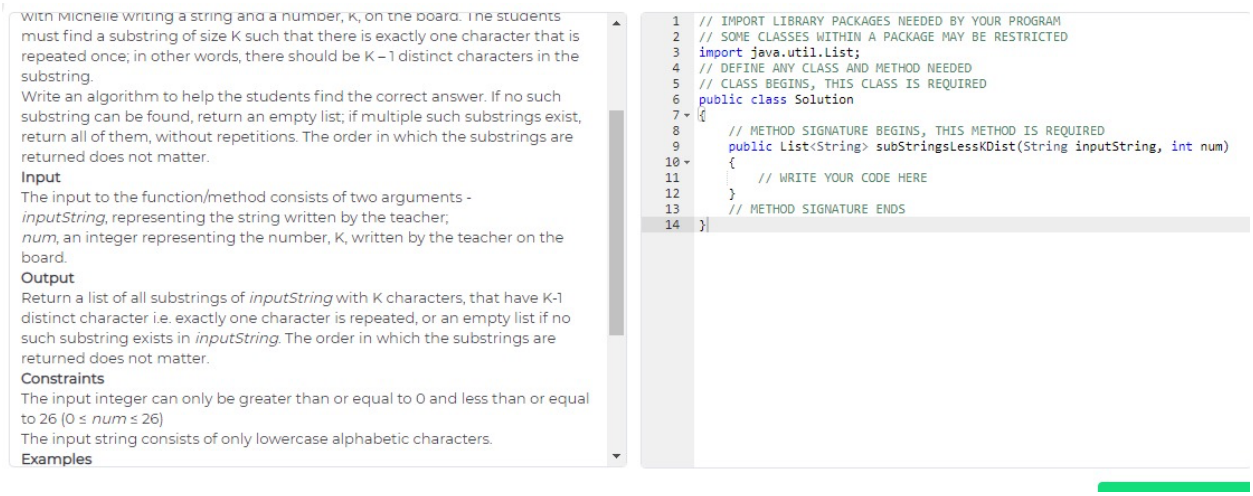
   （长度为 K, 有 K - 1 个不同）

   https://www.1point3acres.com/bbs/thread-483122-1-1.html
   https://leetcode.com/discuss/interview-question/124652/Amazon-onsite-interview-question
   https://github.com/ericster/workspaceMars/blob/0bb98a042f029d4a83ad35213c313973a7263c32/subStringsLessKDist/src/subStringsLessKDist/Solution.java
   https://ideone.com/9ToAFo

   Michelle has created a word game for her students. The word game begins with Michelle writing a string and a number, K, on the board.
   The students must find a substring of size K such that there is exactly one character that is repeated one;
   in other words, there should be k - 1 distinct characters in the substring.
   Write an algorithm to help the students find the correct answer. If no such substring can be found, return an empty list;
   if multiple such substrings exist, return all them, without repetitions. The order in which the substrings are does not matter.
   Input:
   The input to the function/method consists of two arguments - inputString, representing the string written by the teacher;
   num an integer representing the number, K, written by the teacher on the board.
   Output:
   Return a list of all substrings of inputString with K characters, that have k-1 distinct character i.e. exactly one character is repeated, or an empty list if no such substring exist in inputString.
   The order in which the substrings are returned does not matter.
   Constraints:
   The input integer can only be greater than or equal to 0 and less than or equal to 26 (0 <= num <= 26)
   The input string consists of only lowercase alphabetic characters.
   Example

Input:
inputString = awaglk
num = 4
Output:
[awag]
Explanation:
The substrings are {awag, wagl, aglk}
The answer is awag as it has 3 distinct characters in a string of size 4, and only one character is repeated twice.

此题有 16 个隐藏 Testcase, 其中 8 个的情况应该是重复的 Substring, 用 Set 保存结果然后再存到 List 里面， 最后通过 16 个 case。



1. **Return the number of all the substring with K distinct characters(没有限制子串长度，只要有 K 个 distinct 就行, 而且不需要限制子串必须 distinct，因此不用 set())**

Willy Wonka devised a fun game for the city to help identify...

```
int countKDistinctSubstrings(String inputString, int num) {
    if(inputString == null || inputString.length() == 0 || num == 0 || num > inputString.length()) {
        return 0;
    }

    int res = 0;
    int n = inputString.length();
    int[] count = new int[26];

    for(int i = 0; i < n; i++) {
        int distinctNum = 0;
        Arrays.fill(count, 0);
```

```
            for(int j = i; j < n; j++) {
                char c = inputString.charAt(j);
                if(count[c - 'a'] == 0) {
                    distinctNum++;
                }
                count[c - 'a']++;
                if(distinctNum == num) {
                    res++;
                }
            }
        }
        return res;
    }
```

2. Number of restaurants

https://www.lintcode.com/problem/number-of-restaurants/description?_from=ladder&&fromId=69

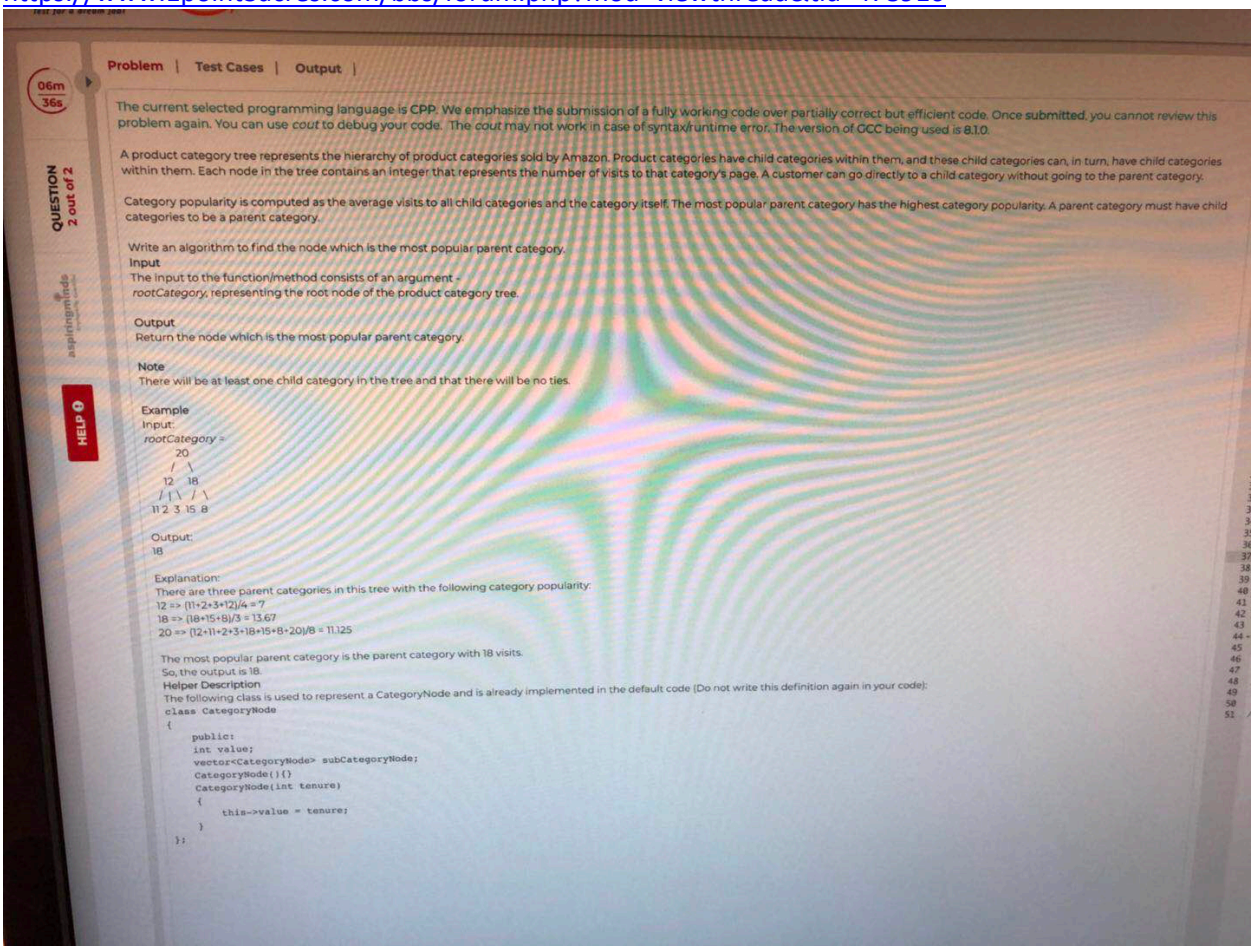
```
public class Solution {
    /**
     * @param restaurant:
     * @param n:
     * @return: nothing
     */
    public List<List<Integer>> nearestRestaurant(List<List<Integer>> restaurant, int n) {
        // Write your code here
        if(restaurant == null || restaurant.size() == 0 || n > restaurant.size()) {
            return null;
        }

        List<List<Integer>> ans = new ArrayList<>();
        int furthestDistance = 0;
        int[] distances = new int[restaurant.size()];

        for(int i = 0; i < distances.length; i++) {
            distances[i] = calculateDistance(restaurant.get(i));
        }

        Arrays.sort(distances);
        furthestDistance = distances[n - 1];

        for(int i = 0; i < restaurant.size() && ans.size() < n; i++) {
            if(calculateDistance(restaurant.get(i)) <= furthestDistance) {
                ans.add(restaurant.get(i));
            }
        }
```

```
        return ans;
    }

    private int calculateDistance(List<Integer> point) {
        return point.get(0) * point.get(0) + point.get(1) * point.get(1);
    }
}
```

3. Aerial Movie 飞机上的电影
   https://www.lintcode.com/problem/aerial-movie/description?_from=ladder&&fromId=69

```
public class Solution {
    /**
     * @param t: the length of the flight
     * @param dur: the length of movies
     * @return: output the lengths of two movies
     */
    public int[] aerial_Movie(int t, int[] dur) {
        // Write your code here
        // double pointers
        if(dur == null || dur.length == 0 || t <= 30) {
            return new int[]{};
        }
        Arrays.sort(dur);
        t -= 30;
        int[] ans = new int[2];
        int low = 0, high = dur.length - 1;
        int diff = Integer.MAX_VALUE;
        while(low < high) {
            int total = dur[low] + dur[high];
            if(total == t) {
                return new int[]{dur[low], dur[high]};
            } else if (total < t) {
                if(t - total < diff) {
                    diff = t - total;
                    ans[0] = dur[low];
                    ans[1] = dur[high];
                }
                low++;
            } else {
                high--;
            }
        }
        return ans;
    }
}
```

4. **getMostPopularNode** (general tree, leaves not counted), return tree node, Maximum Average Sum Subtree
   https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=478916



Problem | Test Cases | Output |

06m 36s

QUESTION 2 out of 2

HELP

The current selected programming language is CPP. We emphasize the submission of a fully working code over partially correct but efficient code. Once submitted, you cannot review this problem again. You can use *cout* to debug your code. The *cout* may not work in case of syntax/runtime error. The version of GCC being used is 8.1.0.

A product category tree represents the hierarchy of product categories sold by Amazon. Product categories have child categories within them, and these child categories can, in turn, have child categories within them. Each node in the tree contains an integer that represents the number of visits to that category's page. A customer can go directly to a child category without going to the parent category.

Category popularity is computed as the average visits to all child categories and the category itself. The most popular parent category has the highest category popularity. A parent category must have child categories to be a parent category.

Write an algorithm to find the node which is the most popular parent category.

Input

The input to the function/method consists of an argument -
rootCategory, representing the root node of the product category tree.

Output

Return the node which is the most popular parent category.

Note

There will be at least one child category in the tree and that there will be no ties.

Example

Input:
rootCategory =

```
      20
     /  \
    12   18
   / | \  / \
  11 2 3 15 8
```

Output:
18

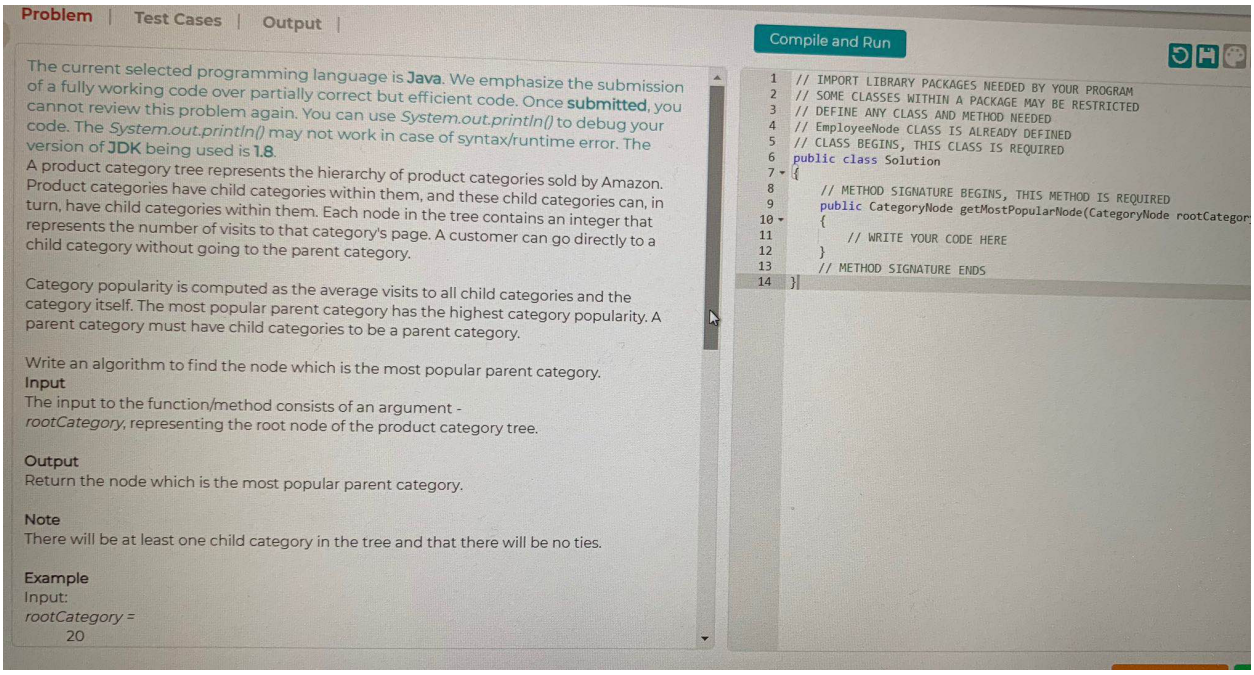
Explanation:
There are three parent categories in this tree with the following category popularity:
12 => (11+2+3+12)/4 = 7
18 => (18+15+8)/3 = 13.67
20 => (12+11+2+3+18+15+8+20)/8 = 11.125

The most popular parent category is the parent category with 18 visits.
So, the output is 18.

Helper Description

The following class is used to represent a CategoryNode and is already implemented in the default code (Do not write this definition again in your code):

```
class CategoryNode
{
    public:
    int value;
    vector<CategoryNode> subCategoryNode;
    CategoryNode(){}
    CategoryNode(int tenure)
    {
        this->value = tenure;
    }
};
```

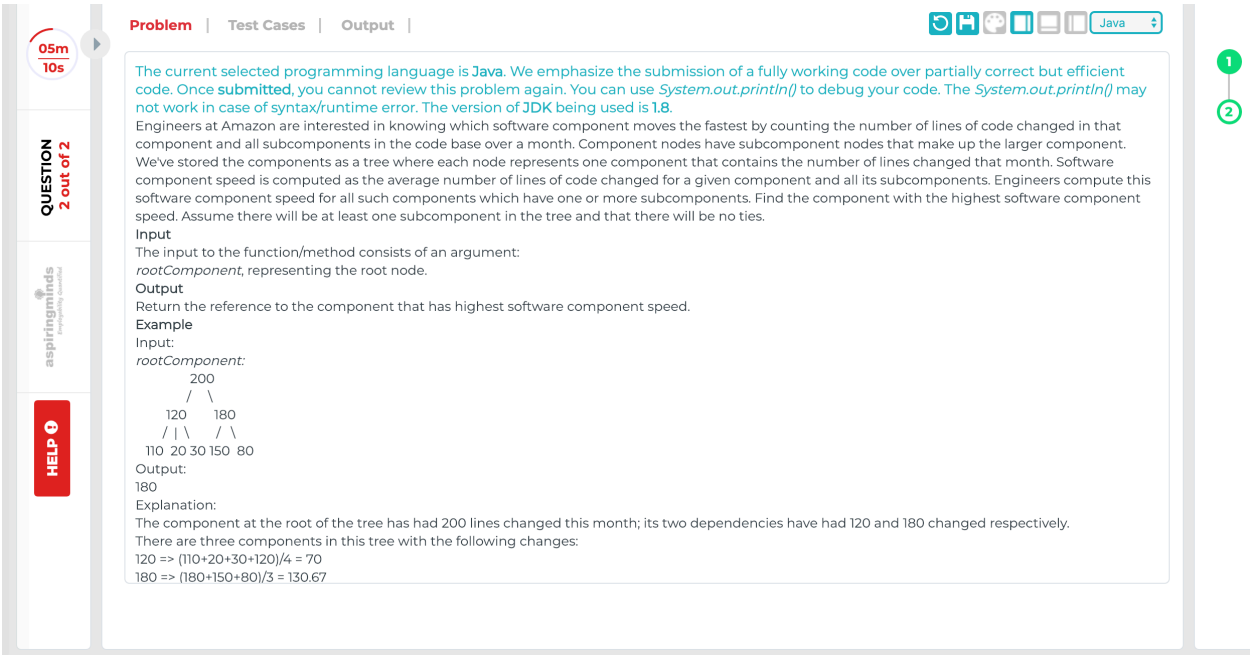

Problem | Test Cases | Output |
Compile and Run
The current selected programming language is Java. We emphasize the submission of a fully working code over partially correct but efficient code. Once submitted, you cannot review this problem again. You can use System.out.println() to debug your code. The System.out.println() may not work in case of syntax/runtime error. The version of JDK being used is 1.8.
A product category tree represents the hierarchy of product categories sold by Amazon. Product categories have child categories within them, and these child categories can, in turn, have child categories within them. Each node in the tree contains an integer that represents the number of visits to that category's page. A customer can go directly to a child category without going to the parent category.
Category popularity is computed as the average visits to all child categories and the category itself. The most popular parent category has the highest category popularity. A parent category must have child categories to be a parent category.
Write an algorithm to find the node which is the most popular parent category.
Input
The input to the function/method consists of an argument -
rootCategory, representing the root node of the product category tree.
Output
Return the node which is the most popular parent category.
Note
There will be at least one child category in the tree and that there will be no ties.
Example
Input:
rootCategory =
20
// IMPORT LIBRARY PACKAGES NEEDED BY YOUR PROGRAM
// SOME CLASSES WITHIN A PACKAGE MAY BE RESTRICTED
// DEFINE ANY CLASS AND METHOD NEEDED
// EmployeeNode CLASS IS ALREADY DEFINED
// CLASS BEGINS, THIS CLASS IS REQUIRED
public class Solution
{
// METHOD SIGNATURE BEGINS, THIS METHOD IS REQUIRED
public CategoryNode getMostPopularNode(CategoryNode rootCategor
{
// WRITE YOUR CODE HERE
}
// METHOD SIGNATURE ENDS
}

```java
// CLASS BEGINS, THIS CLASS IS REQUIRED
import java.util.*;

public class Solution
{
    class Result {
            CategoryNode node;
            int sum;
            int size;
            public Result(CategoryNode node, int sum, int size){
                this.node = node;
                this.sum = sum;
                this.size = size;
            }
        }

    private Result res = null;

    // METHOD SIGNATURE BEGINS, THIS METHOD IS REQUIRED
    public CategoryNode getMostPopularNode(CategoryNode rootCategory)
    {
        if (rootCategory == null){
            return null;
        }
        Result rootRes = helper(rootCategory);
        return res.node;
    }
    // METHOD SIGNATURE ENDS

    public Result helper(CategoryNode root){
        if (root == null){
            return new Result(null, 0, 0);
        }

        ArrayList<Result> results = new ArrayList<Result>();
        for(CategoryNode n: root.subCategoryNode){
            results.add(helper(n));
        }
        int childSum = 0;
        int childSize = 0;
        for (Result r: results){
            childSum += r.sum;
            childSize += r.size;
        }
        Result curRes = new Result(root, childSum + root.value, childSize + 1);
        if (res == null || curRes.sum * res.size > res.sum * curRes.size){
            if (curRes.size > 1)
                res = curRes;
        }
        return curRes;
    }


}
```

Index: getMostPopularNode

5. **getFastestComponent()**

https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=480213



6. Two sum Cloest 货车装货问题

1. two sum closest(<= target)

Input:
the input to the function/method consists of three arguments,
numContainers, an integer representing the number of containers;
maxCapacity, a real number representing the maximum capacity of the shelf;
containerWt, a list of real numbers represneting the weight of the containers

Output:
Return a pair of real numbers representing the weights of the two heaviest containers chosen to be carried on the shelf.

Example:
Input:
num Containers = 6
maxCapacity=43.3
containersWt=[7.33,8.13,103.7313,11.24,23.79,18.350]

Output:
[23.79, 18.350]

7. Highest Five

https://yeqiuquan.blogspot.com/2017/03/lintcode-613-high-five.html

Problem | Test Cases | Output |

At Amazon, we focus on the customer, and one important metric is how long a customer waits for a page to render. Every time we render a page we record the page rendered, date and time the page was rendered, and how long it took to render the page. To help assess the customer experience we want to know how lon on average it is taking to render each page, but we are looking for outliers. To calculate these outliers we take the five longest (worst) rendering times for a page and average them together. Assume that each page has been rendered at least five times.

Write an algorithm to find the average of five worst rendering times for each page.

Input

The input to the function/method consists of two arguments-

renderCount, an integer representing the total number of pages to be rendered (includes the repeated rendering of the same page),

renderTimeOfPages, a list where each element of the list consists of an integer representing the page ID and a real number representing the rendering time of the page.

Output

Return a list where each element of the list consists of an integer representing the page ID and a real number representing the average of five worst rendering times o each page.

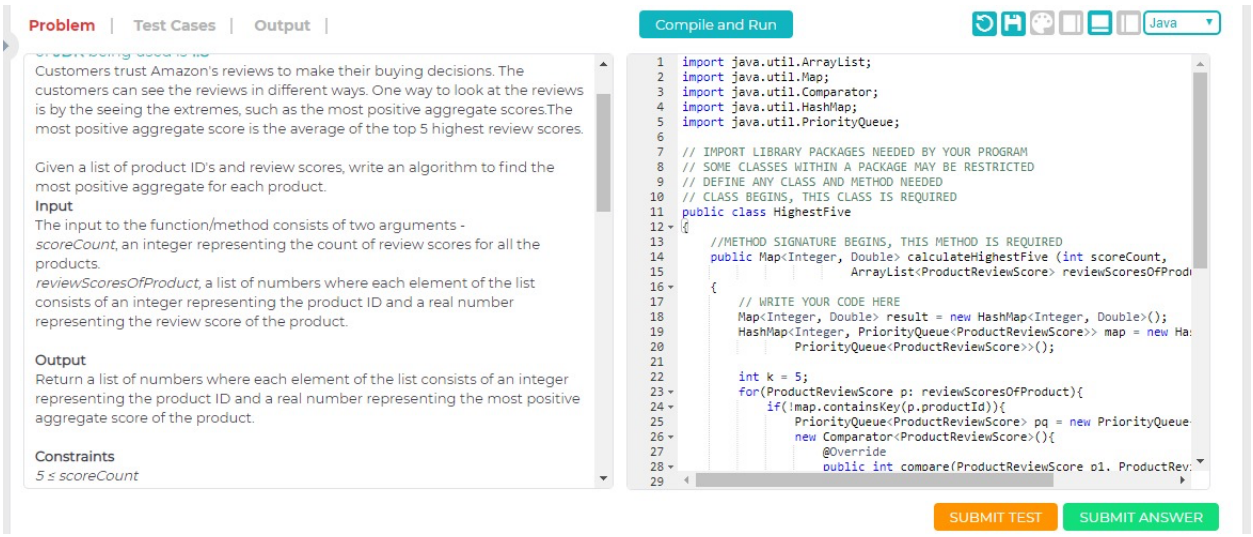
Example

Input:

renderCount = 13

renderTimeOfPages =

[[pageID: 1, renderTime: 40],
[pageID: 2, renderTime: 90],
[pageID: 1, renderTime: 50],



2. Highest Five*Input: 一个二维数组（实际是给出的[ProductReviewScore] class），[[product id, val], [product id, val],....]*
要求找到每个product id 对应的val中最大5个数的平均值。
输出：[[product id, average value of top 5], [product id, average value of top 5], ...]
eg:
假设输入为 [[id=1, 1], [id = 2, 2], [id=1, 3], [id = 2, 4], [id=1, 5], [id = 2, 6], [id=1, 7], [id = 2, 8], [id=1, 9], [id = 2, 10], [id=1, 11], [id = 2, 12]]
id=1,对应的 val 有 1,3,5,7,9,11. 故得到最大5个数的平均值 （3+5+7+9+11）/5
id=2, 对应的 val 有 2,4,6,8,10,12,故得到最大5个数的平均值(4+6+8+10+12)/5
注意给出的product review score的type也是double。

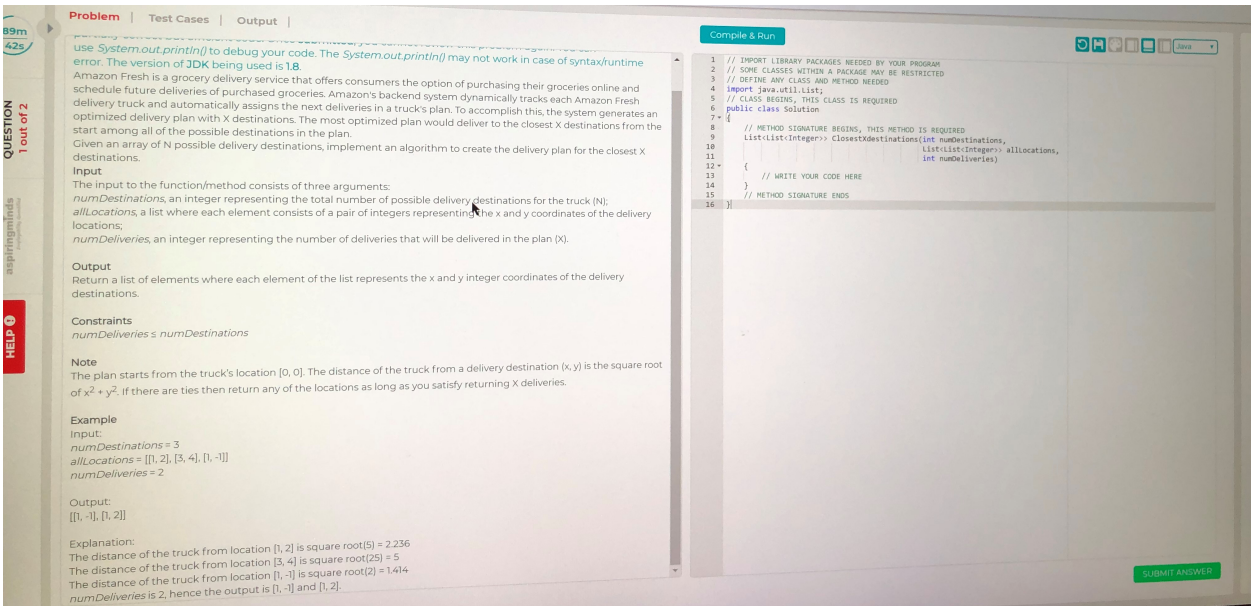
---

8. K closest points

https://www.1point3acres.com/bbs/thread-457483-1-1.html
https://www.1point3acres.com/bbs/thread-469583-1-1.html

1. Amazon Fresh 题目

2.



Amazon Fresh is a grocery delivery service that offers consumers the option of purchasing their groceries online and schedule future deliveries of purchased groceries. Amazon's backend system dynamically tracks each Amazon Fresh delivery truck and automatically assigns the next deliveries in a truck's plan. To accomplish this, the system generates an optimized delivery plan with X destinations. The most optimized plan would deliver to the closest X destinations from the start among all of the possible destinations in the plan.

Given an array of N possible delivery destinations, implement an algorithm to create the delivery plan for the closest X destinations.

Input

The input to the function/method consists of three arguments:
numDestinations, an integer representing the total number of possible delivery destinations for the truck (N);
allLocations, a list where each element consists of a pair of integers representing the x and y coordinates of the delivery locations;
numDeliveries, an integer representing the number of deliveries that will be delivered in the plan (X).

Output

Return a list of elements where each element of the list represents the x and y integer coordinates of the delivery destinations.

Note
The plan starts from the truck's location [0, 0]. The distance of the truck from a delivery destination (x, y) is the square root of $x^2 + y^2$. If there are ties then return any of the locations as long as you satisfy returning X deliveries.

Example
Input:
numDestinations = 3
allLocations = [[1, 2], [3, 4], [1, -1]]
numDeliveries = 2

Output:
[[1, -1], [1, 2]]

Explanation:
The distance of the truck from location [1, 2] is square root(5) = 2.236
The distance of the truck from location [3, 4] is square root(25) = 5
The distance of the truck from location [1, -1] is square root(2) = 1.414
numDeliveries is 2, hence the output is [1, -1] and [1, 2].

3. Steak House 牛排屋问题

9. **Maze 迷宫问题，removeObstacle**
https://www.1point3acres.com/bbs/thread-469583-1-1.html
https://www.1point3acres.com/bbs/thread-457483-1-1.html
https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=468517
给定一个二维矩阵代表一个有待开发的停车场，1 代表平地，
0 代表沟壑，9 代表障碍物；有个机器人可以在平地上行走，不能进入沟壑，
目的是找到最短距离使得机器人从左上角去到障碍物所在的地方。
我用 BFS，然后记录每个点的最短距离，完成所有搜索后，
再输出障碍物的最短距离。关键是如何 update 最短距离。
做第二题的时候，网络好像不太好，compiler 没有反应，
然后它并不会更新 output 的结果，所以我以为我的更改还是没对，
幸运的是在最后一分钟的时候，再 compile 一遍发现过了。小心出现这种情况。

Automata Amazon

Question 2 out of 2

Problem | Test Cases | Output

You are in charge of preparing a recently purchased lot for one of Amazon's new building. The lot is covered with trenches and has a single obstacle that needs to be taken down before the foundation can be prepared for the building. The demolition robot must remove the obstacle before progress can be made on the building.

Write an algorithm to determine the minimum distance required for the demolition robot to remove the obstacle.

Assumptions:

- The lot is flat, except for trenches, and can be represented as a two-dimensional grid.
- The demolition robot must start from the top-left corner of the lot, which is always flat, and can move one block up, down, left, or right at a time.
- The demolition robot cannot enter trenches and cannot leave the lot.
- The flat areas are represented as 1, areas with trenches are represented by 0 and the obstacle is represented by 9.

Input

The input to the function/method consists of three arguments:
numRows, an integer representing the number of rows;
numColumns, an integer representing the number of columns;
lot, representing the two-dimensional grid of integers.

Output

Return an integer representing the minimum distance traversed to remove the obstacle else return -1.

Constraints

$1 \leq numRows, numColumns \leq 1000$

Input
The input to the function/method consists of three arguments:
numRows, an integer representing the number of rows;
numColumns, an integer representing the number of columns;
lot, representing the two-dimensional grid of integers.

Output
Return an integer representing the minimum distance traversed to remove the obstacle else return -1.

Constraints
$1 \leq numRows, numColumns \leq 1000$

Example
Input:
numRows = 3
numColumns = 3
lot =
[[1, 0, 0],
[1, 0, 0],
[1, 9, 1]]

Output:
3

Explanation:
Starting from the top-left corner, the demolition robot traversed the cells (0,0) -> (1,0) -> (2,0) -> (2,1).
The robot traversed the total distance 3 to remove the obstacle.
So, the output is 3.

Testcase 1:
Input:

```
3, 3,
[[1, 0, 0],
 [1, 0, 0],
 [1, 9, 1]]
```

Expected Return Value:

```
3
```

Testcase 2:
Input:

```
5, 4,
[[1, 1, 1, 1],
 [0, 1, 1, 1],
 [0, 1, 0, 1],
 [1, 1, 9, 1],
 [0, 0, 1, 1]]
```

Expected Return Value:

```
5
```

```
1  // INCLUDE HEADER FILES NEEDED BY YOUR PROGRAM
2  // SOME LIBRARY FUNCTIONALITY MAY BE RESTRICTED
3  // DEFINE ANY FUNCTION NEEDED
4  // FUNCTION SIGNATURE BEGINS, THIS FUNCTION IS REQUIRED
5  int removeObstacle(int numRows, int numColumns, int **lot)
6  {
7      // WRITE YOUR CODE HERE
8  }
9  // FUNCTION SIGNATURE ENDS
```

WorkStyle :

https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=445121&highlight=amazon%2Boa
https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=474434&highlight=amazon

比较全的笔记：
https://www.1point3acres.com/bbs/forum.php?mod=viewthread&tid=480213&highlight=oa2