Kth Smallest Number in Multiplication Table

Nearly every one have used the Multiplication Table. But could you find out the `k-th` smallest number quickly from the multiplication table?

Given the height `m` and the length `n` of a `m * n` Multiplication Table, and a positive integer `k`, you need to return the `k-th` smallest number in this table.

Example 1:

```
Input: m = 3, n = 3, k = 5
Output:
Explanation:
The Multiplication Table:
1 2 3
2 4 6
3 6 9

The 5-th smallest number is 3 (1, 2, 2, 3, 3).
```

Example 2:

```
Input: m = 2, n = 3, k = 6
Output:
Explanation:
The Multiplication Table:
1 2 3
2 4 6

The 6-th smallest number is 6 (1, 2, 2, 3, 4, 6).
```

Note:

1. The `m` and `n` will be in the range [1, 30000].
2. The `k` will be in the range [1, m * n]

Solution 1

```
class Solution {
    public int findKthNumber(int m, int n, int k) {
     int low = 1 , high = m * n + 1;

     while (low < high) {
         int mid = low + (high - low) / 2;
         int c = count(mid, m, n);
         if (c >= k) high = mid;
            else low = mid + 1;
     }

     return high;
    }

    private int count(int v, int m, int n) {
 int count = 0;
 for (int i = 1; i <= m; i++) {
     int temp = Math.min(v / i , n);
     count += temp;
 }
 return count;
    }
}
```

written by shawngao original link here

Solution 2

The name and description are very misleading. This should be the kth smallest number.

written by Tong.Liu original link here

Solution 3

This exact problem is found on the Codeforces OJ on this link:
http://codeforces.com/contest/448/problem/D
Its solution is also fully written on stack overflow on this link:
https://stackoverflow.com/questions/33464901/using-binary-search-to-find-k-th-largest-number-in-nm-multiplication-table

I found several people who blindly copied that code and got AC!. The reason I know this problem was on Stackoverflow was because **I** was the one who asked that question in 2015!!

written by eyfmharb original link here