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POUR1 - Pouring water

#gcd (/problems/tag/gcd) #recursion (/problems/tag/recursion)

Given two vessels, one of which can accommodate a litres of water and the other - b litres of water, determine the number of steps required to obtain exactly c litres of water in one of the vessels.

At the beginning both vessels are empty. The following operations are counted as 'steps':

- · emptying a vessel,
- · filling a vessel,
- pouring water from one vessel to the other, without spilling, until one of the vessels is either full or empty.

Input

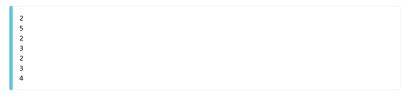
An integer t, $1 \le t \le 100$, denoting the number of testcases, followed by t sets of input data, each consisting of three positive integers a, b, c, not larger than 40000, given in separate lines.

Output

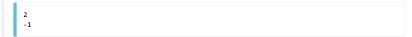
For each set of input data, output the minimum number of steps required to obtain c litres, or -1 if this is impossible.

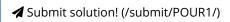
Example

Sample input:



Sample output:





hide comments





mahilewets (/users/mahilewets): 2017-08-29 20:18:26 I think BFS is bad here

Because 40000 limitation

If limitation is like 255

We can easily afford BFS even with three vessels



arthur1991 (/users/arthur1991): 2017-03-26 07:38:10 i love giangian



osama2003 (/users/osama2003): 2017-01-25 00:31:58





muneebaadil (/users/muneebaadil): 2017-01-04 21:37:23

Doing through BFS+maps too. But TLE. Using the following algorithm.

Each node having pair (x, y) derives four more pairs (provided that this node isn't visited before)

 $\hbox{(a, y), (x, b), (x-min(x, b-y), y+min(x, b-y)), (x+min(y, a-x), y-min(y, a-x)) and finally the node having pair(x, y) is marked visited.}$

What am I doing wrong?



flyingduchman_ (/users/flyingduchman_): 2016-12-27 14:37:10

Actual problem: You are at the side of a river. You have a "a" liter jug and a "b" liter jug. The jugs do not have markings to allow measuring smaller quantities. How canyou use the jugs to measure "c" liter of water?

Representing the problem in equation: ax + by = c where

x = number of time one jug is poured/discharged(+ve/-ve)

y = number of time the other jug is poured/discharged(+ve/-ve)

Theorem. The Diophantine equation ax+by = c is solvable

if and only if gcd(a, b) divides c.

Corner case :c must satisfy: c <= max(a,b)

Simulation:

You must simulate by doing "pouring action" only in one jug and "discharging action" only in the opposite jug.

(1)pour in a, discharge in b: if a is empty pour a full, if b is full the discharge and make b empty. Otherwise, transfer water from a to b. Each of those three condition is a step & can happen only once at a time.

(2)pour in b, discharge in a: if b is empty pour it full, if a is full make it empty. Otherwise, transfer water from b to a.

count total steps for (1) and (2), the minimum is the answer.



kushalanand (/users/kushalanand): 2016-10-29 23:37:15

My 69th. BFS + maps :D



albus111 (/users/albus111): 2016-09-16 07:23:49 Is there a math formula for this question?



conquistador (/users/conquistador): 2016-08-12 20:28:31 My 100th.. .Beginners believe in yourself . YOU CAN SOLVE IT. Dont rely on spojtoolkit for this question.

Last edit: 2016-08-12 21:13:54



Rajat Sharma (/users/rjtsh): 2016-08-03 20:26:02 AC Java : GCD along with logic(if conditions)

after solving this problem , one II know: euclidean algorithm, extended euclidean algorithm, and most importantly this R (i+1) = R (i-1) - Q (i) R (i) which provides the synopsis for the extended euclidean algorithm.

Last edit: 2016-08-03 20:32:31



surayans tiwari(http://bit.ly/1EPzcpv) (/users/terminated): 2016-07-10 12:47:45 0.29 sec using bfs+map and 0.00 using eea,, nice question, worth the time;

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- 2. Please be careful, leave short comments only. Don't spam here.
- 3. For more discussion (hints, ideas, solutions) please visit our forum (/forum).
- 4. Authors of the problems are allowed to delete the post and use html code here (e.g. to provide some useful links).

✓ Submit solution! (/submit/POUR1/)

Added by: adrian (/users/adrian)

Date: 2004-05-31 Time limit: 1s 50000B Source limit: Memory limit: 1536MB

Cluster: Cube (Intel G860) (/clusters/)

All except: NODEJS PERL6 Languages:

VB.NET

An ancient problem,

Resource: formulated in these words

by Mr Tadeusz Ratajczak

Vote requirements

A

- ✓ be spoj user for at least 5 days
- ✓ solve at least 15 problems
- **x** solve this problem