Die hard puzzle

See the video

https://www.youtube.com/watch?v=6cAbgAaEOVE

Problem statement

You have a 3 litre jar and a 5 litre jar. How would you measure 4 litres?

Try it out!

How would you do it programatically?

Linear diophantine equations and some facts

- Diophantine equations
  - Equations with integral solutions
- Linear Diophantine equation
  - Peculiar property
  - For an equation ax+by=c, c%gcd(a,b) == 0, c should be divisible by gcd of a and b
- GCD is calculated using extended euclidean method
  - ax+by=gcd(a,b)
- gcd(a,b) == 1, they are coprime, used in cryptographic algorithms

How is it related?

- Our problem can be stated as 3x+5y=4
- 4%gcd(3,5) is 0? 4%1 is 0?
- Correct - So we can solve this problem

How?

Algorithm

- Ensure that the container on the left is the smaller quantity (3,5)
- Fill the 3 litre container
- Empty the 5 ltr container (3,0)
- Till either of the containers reach 4 litres
    - Calculate min of 3 and 5-0 = 3
    - Left container subtract temp 3-3 = 0
    - Right container add temp = 0+3 = 3
    - If 4 has been reached - stop
    - If left container is 0 or right container is 5 then fill left container and empty the right container

Output

from to

3 5 4

3 0

0 3

3 3

1 5

1 0

0 1

3 1

0 4

Success