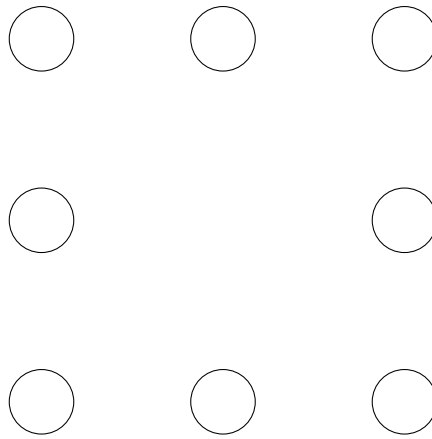


LUCA puzzles 2024: Puzzle 70

Umesh P Narendran

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Puzzle 1 Write 1–8 in the circles so that the sum in each side is 15.



Solution

$$1 + 2 + 3 + \cdots + 8 = 36.$$

Sum in the top row = 15.

Sum in the bottom row = 15.

So, the two numbers in the middle row should add to $36 - 15 - 15 = 6$.

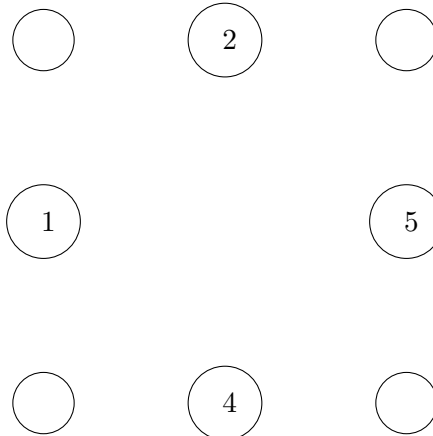
With numbers from 1 to 8, there are only two ways to get the sum 6.

$$1 + 5 = 6$$

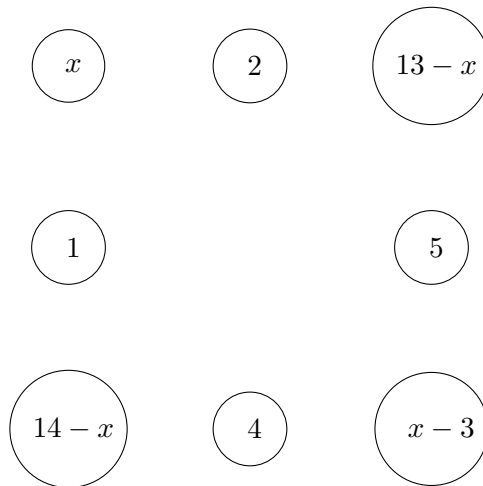
$$2 + 4 = 6$$

So, $(1, 5)$ and $(2, 4)$ should be in the middle slots.

WLOG, let us put as follows:



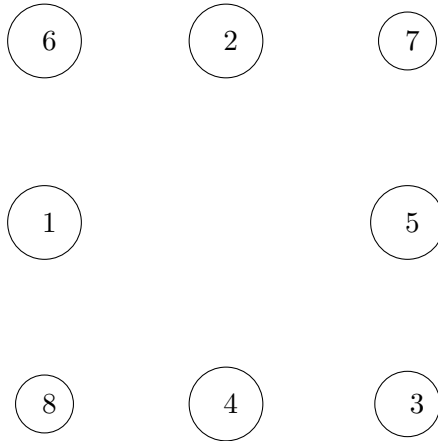
Now, let us assume the top left slot has x . Let us compute the remaining:



Since $x - 3$ is one number and it should be greater than 2, $x \geq 6$.

Since $14 - x$ is one number and it should be at most 8, $x \geq 6$.

Putting $x = 6$,



Let us see there are more solutions.

x cannot be 7, because x and $14 - x$ will have the same value.

x cannot be 8, because $13 - x = 5$, which is already taken.

So the one given above is the only solution.