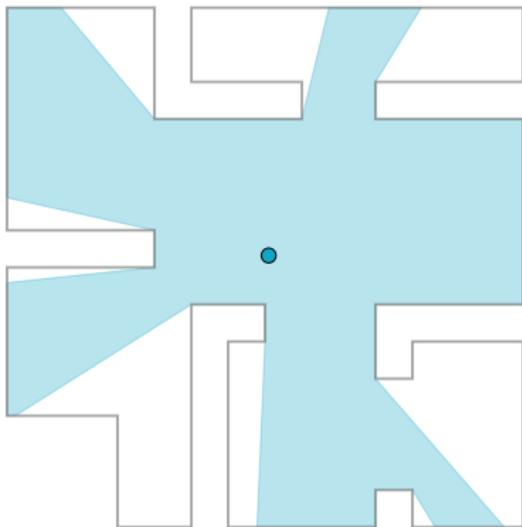**What is...the art gallery theorem?**
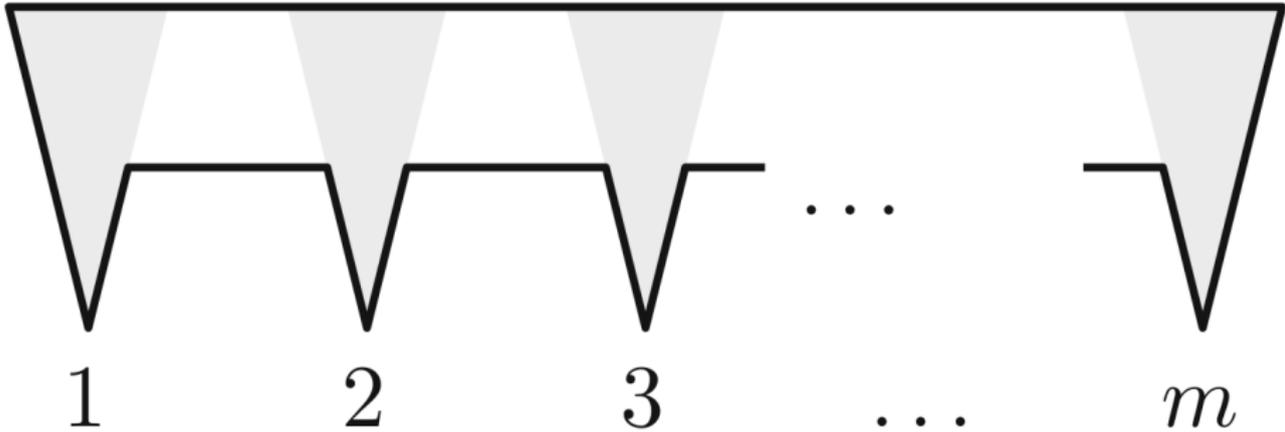
Or: How many cameras suffice?

How many cameras are needed to guard a museum?
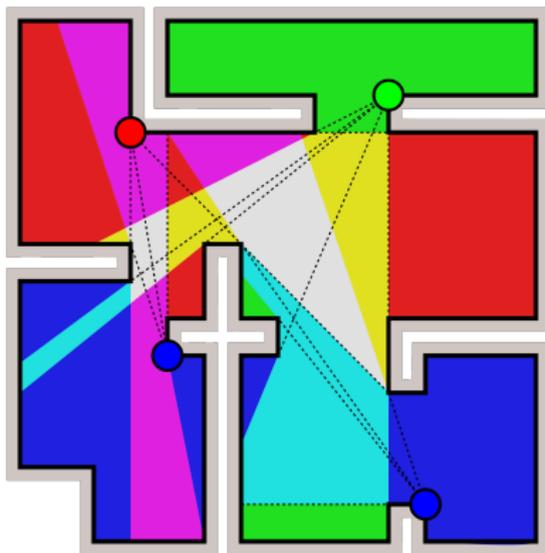

- Museum = closed polygon P
- Cameras c are fixed points in P and can see in any direction
- We want the whole of P to be covered

- In this case $n = 3m$
- $n/3$ cameras are needed
- $\lfloor n/3 \rfloor$ is definitely a lower bound

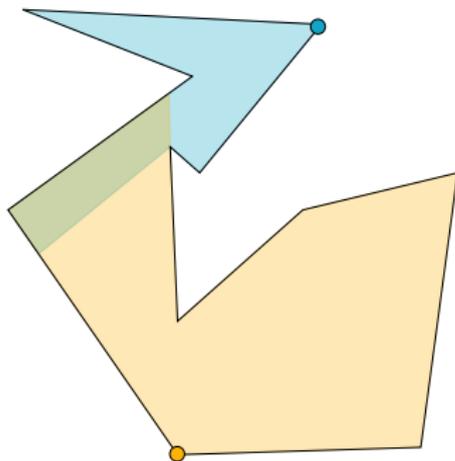# You might be able to do better – but that is not the question

- In this case $n = 35$
- 4 cameras suffice
- 4 is of course much smaller than $\lfloor n/3 \rfloor = 11$ but we do not case
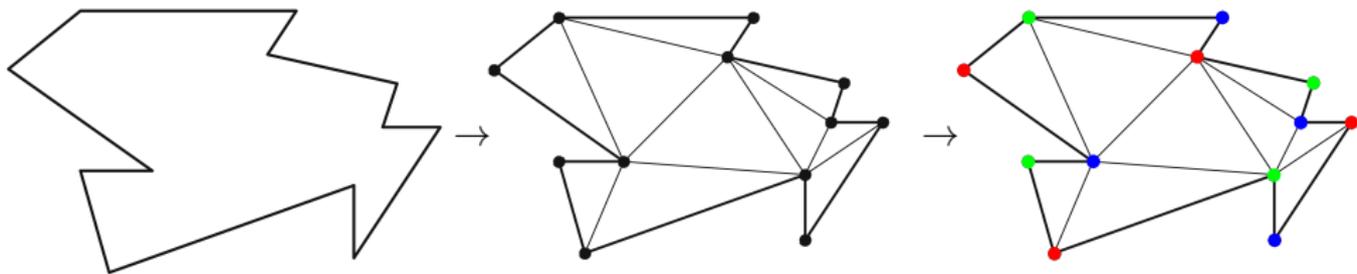
Enter, the theorem

$\lfloor n/3 \rfloor$ cameras always suffice but you can do better:
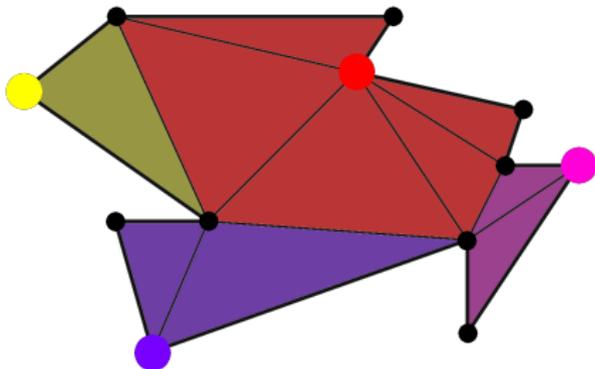

$n = 11$
$\lfloor n/3 \rfloor = 3$

▶ The theorem is due to Chvátal ∼1975

▶ The proof by Fisk ∼1978 uses graph theory Let us sketch how that works!

A problem in graph theory

► Every museum admits a triangulation Easy but not obvious

► Every triangulation can be tricolored Easy but not obvious

► At least one of the color classes contains at most $\lfloor n/3 \rfloor$ vertices Harvest

Thank you for your attention!

I hope that was of some help.