# Math Month Callenge 2022
# Gerrymandering Puzzle

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We came across ancient archives of election results of a long forgotten democratic civilization. The civilization was made up of six provinces which were each given a specific number of representatives at the king's council (not necessarily representative of the province's population). We have three years of election data where party X sent the most representatives to the king's council in each province every year, even though they never received the greatest number of votes in that province. HOW COULD THIS BE? The elections were conducted by dividing each province into districts and the candidate who obtained the majority vote in a district was sent to represent the district at the king's council. Since the members of the provinces moved so frequently, the district lines were re-drawn each year according to the following guidelines.

**District drawing rules**

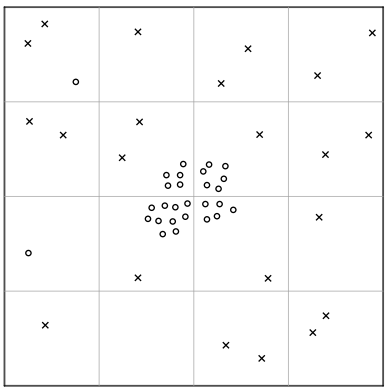
1. No district's population can exceed any other's by more than 5 people.
2. All district lines must follow the grid lines provided
3. All districts must be connected: two members in the same district must be able to walk to each other's house without leaving the district.

We know that each year the prince of the province was able to re-draw the district lines, however the number of districts in any particular province never changed. We also know that there was never a time when there was a tie in any district.

Your objective is to determine the number of districts in each province satisfying the drawing rules and what we know about the elections. Your solution will be a 6-digit number like 436257 where 4 is the number of districts in Province A, 3 is the number of districts in Province B, and so on.

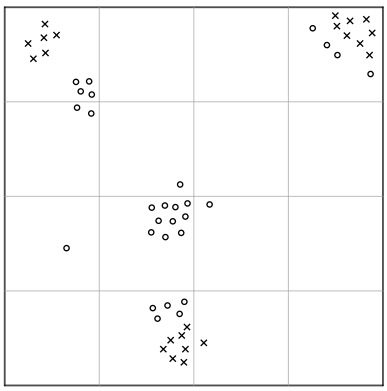
Province A
Population = 50

Year 1



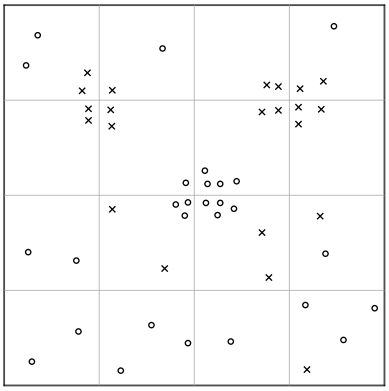
Total Vote Count
X - 22
O - 28

Year 2



Total Vote Count
X - 22
O - 28

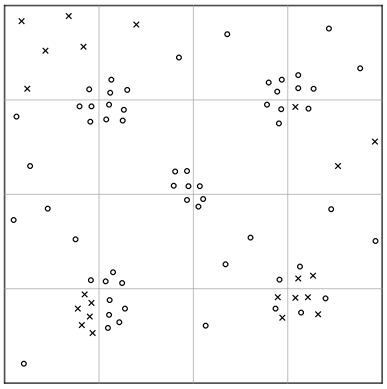
Year 3



Total Vote Count
X - 22
O - 28

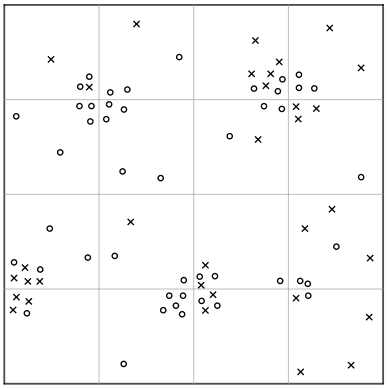
Province B
Population = 80

Year 1



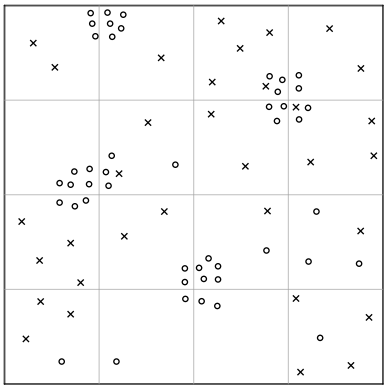
Total Vote Count
X - 22
O - 58

Year 2



Total Vote Count
X - 33
O - 47

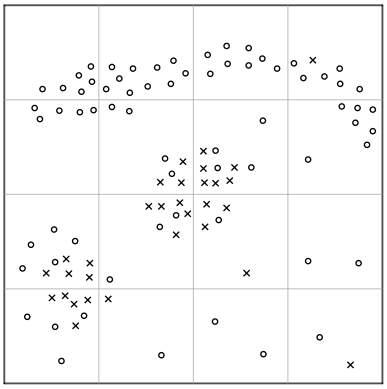
Year 3



Total Vote Count
X - 33
O - 47

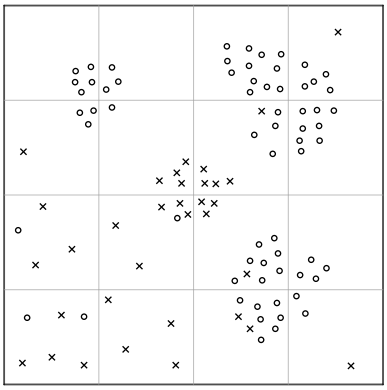
Province C
Population = 100

Year 1



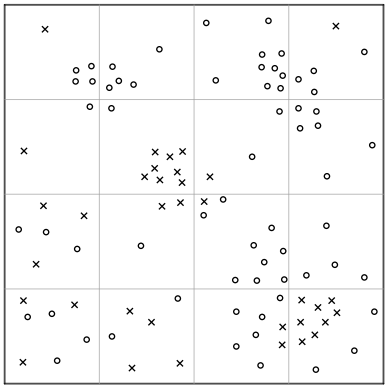
Total Vote Count
X - 31
O - 69

Year 2



Total Vote Count
X - 34
O - 66

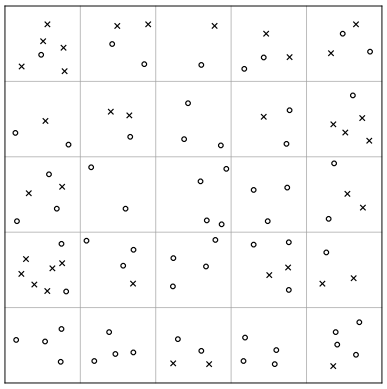
Year 3



Total Vote Count
X - 35
O - 65

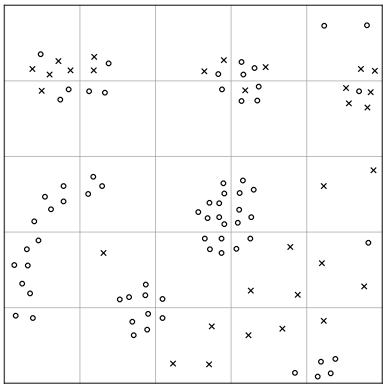
Province D
Population = 100

Year 1



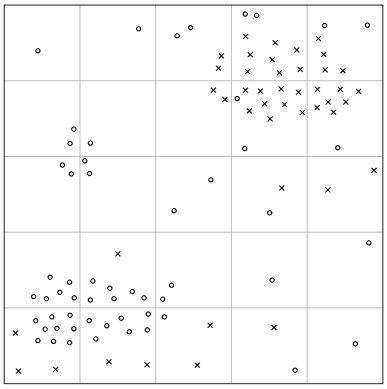
Total Vote Count
X - 38
O - 62

Year 2



Total Vote Count
X - 31
O - 69

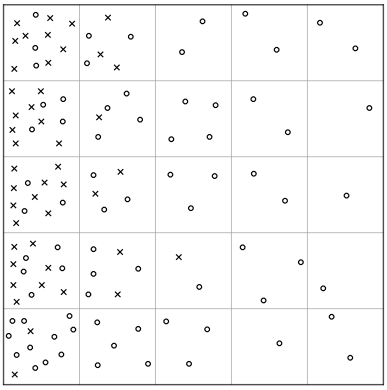
Year 3



Total Vote Count
X - 44
O - 56

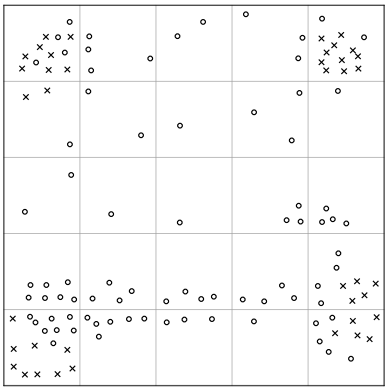
Province E
Population = 120

Year 1



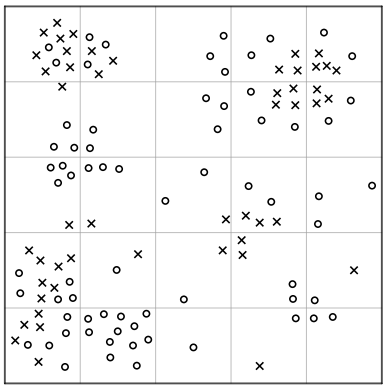
Total Vote Count
X - 45
O - 75

Year 2



Total Vote Count
X - 40
O - 80

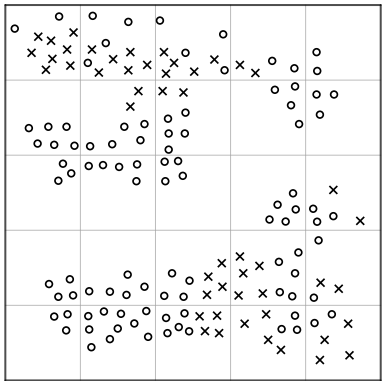
Year 3



Total Vote Count
X - 50
O - 70

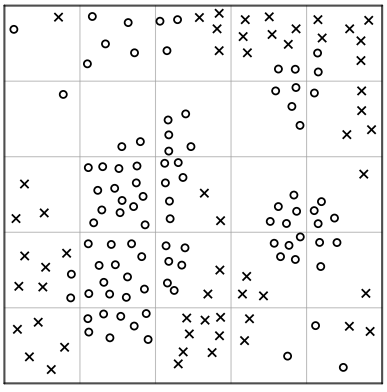
Province F
Population = 150

Year 1



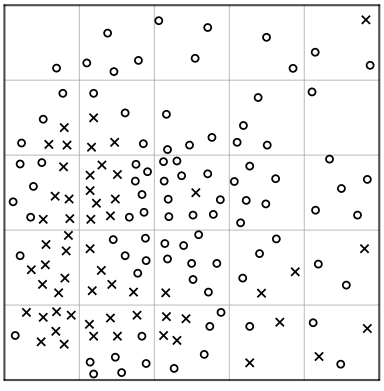
Total Vote Count
X - 50
O - 100

Year 2



Total Vote Count
X - 56
O - 96

Year 3



Total Vote Count
X - 58
O - 92