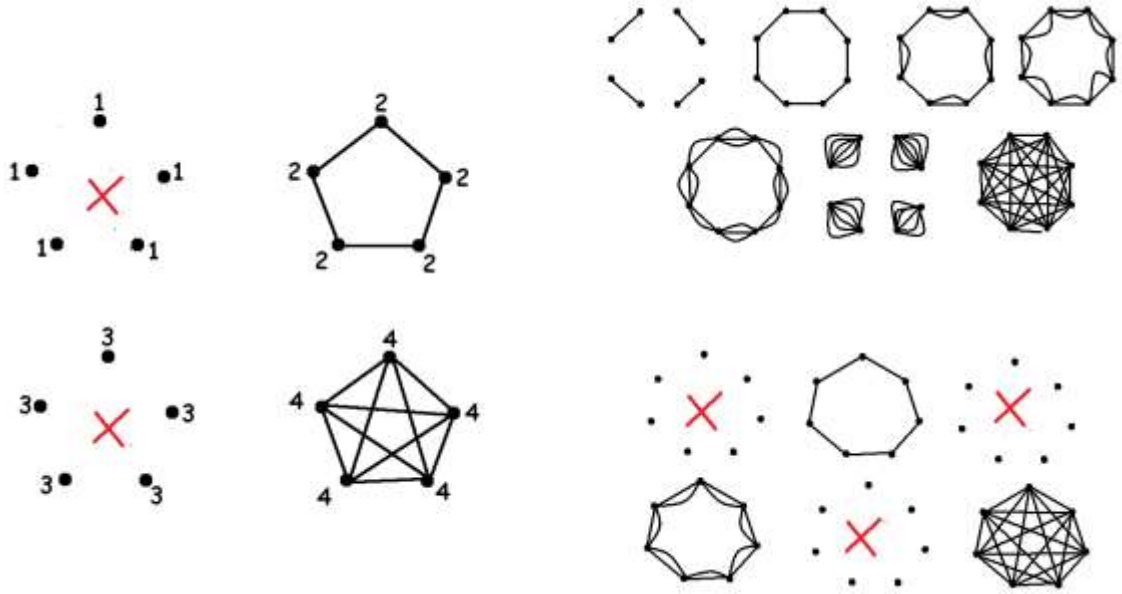
WITHOUT WORDS

Mathematical Puzzles to Confound and Delight

WW 27: SOLUTION



It is impossible to connect an odd number of dots with edges so that the same odd number of edges emanate from each dot. To see why, count the number of edge-ends two different ways:

> If there are e edges in a diagram, then, since each edge has two ends, there are a total of $2e$ edge-ends in the diagram. This is an even number.
>
> If there are N dots and each dot has k edges emanating from it (and hence k edge-ends meeting at the dot), the total number of edge-ends must be Nk.
>
> So we must have $Nk = 2e$.
>
> For this to work either N must be even or k must be even (or both).

Thus the diagrams marked with an X with N and k both odd are impossible to solve. All other diagrams can be completed.

Challenge: Reason that the total number people living or deceased who have taken part in an odd number of handshakes in their lives must be even.