

2 Reduction

We assume $|P| \geq 3$. For each $x \in P$, output an island at $2x$ with bridge requirement $6 - |\{y \in P : |x - y| = 1\}|$ (*big island*) and an island at $x + y$ with bridge requirement 1 (*small island*) for each $y \in \mathbf{Z}^2 \setminus P$ such that $|x - y| = 1$. Fig. 2 shows an example.

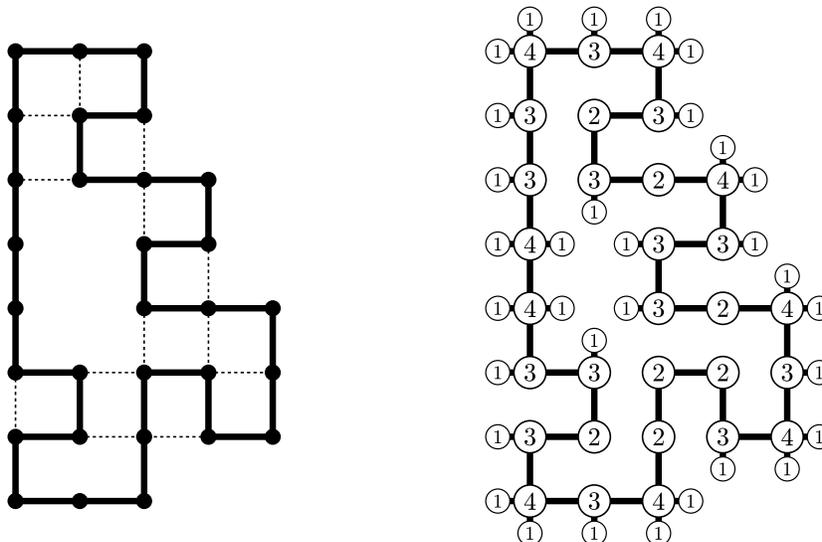


Fig. 2. An example of the reduction and a pair of corresponding solutions.

Because of the reachability constraint, each small island must be connected to a big island, and by construction, there is only one choice. After all such connections have been made, all big islands have a remaining bridge requirement of 2. Since $|P| \geq 3$, the reachability constraint prevents parallel bridges between big islands, and so the connection possibilities now correspond exactly to edges in the unit distance graph of P .

References

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