Difficulty: 2/4 Interest: 1/4

Say that a number M is (n, k)-constructible if there exists an $n \times n$ board with M k-in-a-row markers.

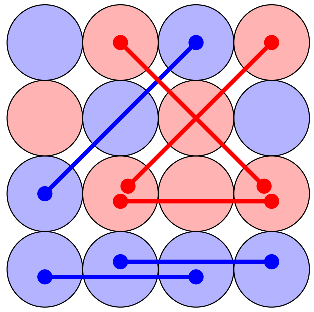

Figure 1: The number 6 is $(4, 3)$-constructible because the above 4×4 board has 6 sets of markers that are placed 3-in-a-row. (This figure was borrowed from Problem 45.)

Question. What is a procedure for determining if a grid has a solution? If it has a unique solution?

Related.

1. What if there are ℓ colors of pieces?
2. What numbers have the greatest number of constructions? Up to dihedral action?
3. What is the smallest number that is (n, k)-constructible?
4. What if this is done on a hypercube or a triangular grid?

References.

Problem 45.