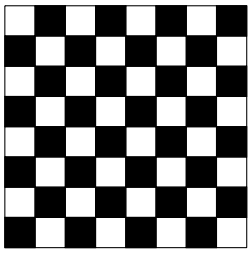
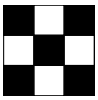
Fall 2015, MATH-304

Chapter 1 - Motivation and warmup

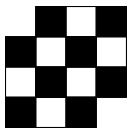
Tiling of a chessbooard:
Is it possible to tile 8×8 chess board with dominoes?



Can you tile any $m \times n$ board? Say 3×3?



Can you tile 4×4 board with missing corners?

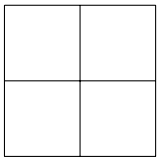


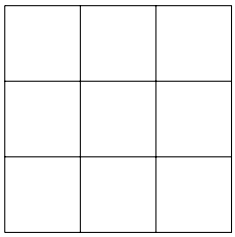
Consider b-ominos instead of dominoes. $b = 4$ example: 
Try to find sufficient and necessary conditions when a board $m \times n$ can be tiled by b-ominoes.

Magic squares: Filling a board $n \times n$ with integers $1 \dots n^2$ such that the sum in every row, column and both diagonals is the same.
Example of a magic square for $n = 4$.

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

Find a magic squares 2×2 and 3×3: (Hint: What is the sum?)





Magic squares: Show there is no magic 3D cube $3 \times 3 \times 3$. All rows, columns and diagonals have the same sum.

Four color theorem, Shortest route problem, Traveling Salesman Problem