Lesson 2: Tilings and colorings

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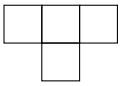
Throughout this whole handout, the tiling pieces can be rotated and reflected in any way.

Problem 1.
An 8×8 chess board has the bottom left and top right corners cut out. Can it be tiled by 1×2 dominoes?

Problem 2.
a) An 8×8 chess board has the squares C6 and G2 cut out. Can it be tiled by 1×2 dominoes?

b) Same question, except with C5 and G2 cut out.

Problem 3.
Is it possible to tile a 10×10 square with T-tetrominoes?
A T-tetromino looks like this:



Problem 4.
A piece of cheese has a shape of a $3 \times 3 \times 3$ cube with the central cube removed. A mouse starts eating a corner cube, and after finishing a cube moves to one of the adjacent cubes. Can the mouse eat all the cheese?

Problem 5.
Show that the 10×10 board cannot be tiled with 1×4 rectangles.

Problem 6.
Is it possible to tile an 8×8 board with a corner cut out with 1×3 rectangles?

Problem 7.
Is it possible to tile an 8×8 board with 32 1×2 dominoes in such a way that 17 of them are horizontal and 15 are vertical?