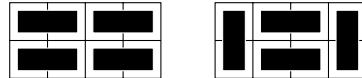
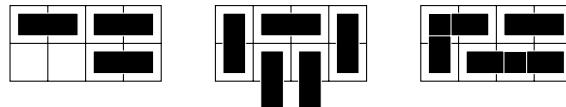


In this assignment, we will explore chessboard tilings. A domino covers exactly two squares of a chessboard that are either horizontally or vertically adjacent. A proper tiling of a board is one where each square is covered *exactly* one domino. For example the following are proper tilings of the 2×4 board with dominoes



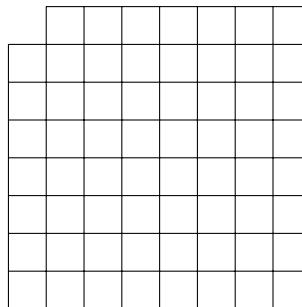
whereas these are not



Justify all answers! If a tiling is possible, exhibit one or give a process which will create one. If a tiling is impossible, you must prove this.

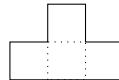
(27 pts)

- (1) [+4] For what values of m and n does an $m \times n$ board have a domino tiling?
- (2) [+8] Consider the 8×8 board with two opposite corners removed:

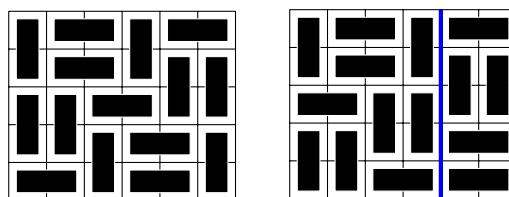


Does this board have a domino tiling?

- (3) Consider the following object called a tetromino:



- (a) [+5] Does the 8×8 board have a tetromino tiling? (Note: the tetromino can be rotated, and we are talking about the standard 8×8 board and not the modified one in the previous question.)
- (b) [+10] How about the 10×10 board?
- (4) **Bonus.** [+4] A domino tiling is said to be *stable* if every horizontal and vertical line drawn through the board must cross some domino. For example, the first tiling is stable, while the second is not.



Does the 6×6 board have a stable domino tiling?