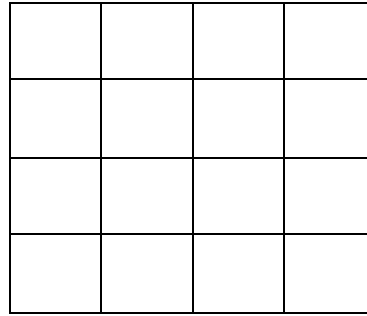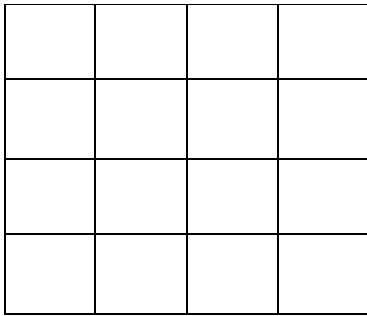Chapel Hill Math Circle – 1.12.18

Tiling

1. Place 12 tiles in the cells of a 4 x 4 square so that every row and every column has an odd number of tiles. How many different ways can we lay out the tiles? Please draw them out.
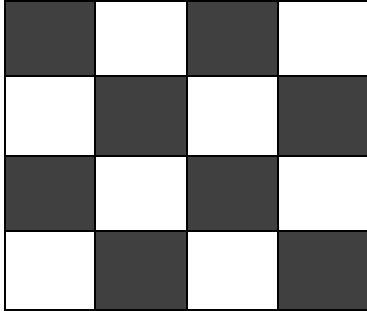
2. Place 10 tiles in the cells of a 4 x 4 square so that every row and every column has an even number of tiles. How many different ways can we lay out the tiles? Please draw them out.
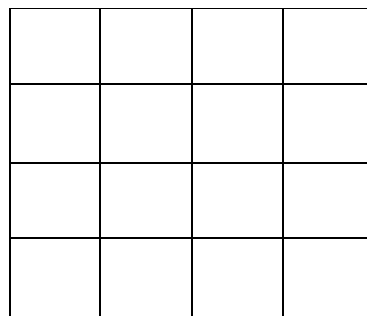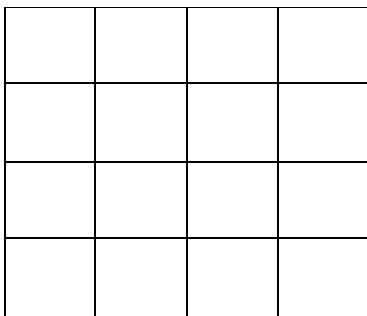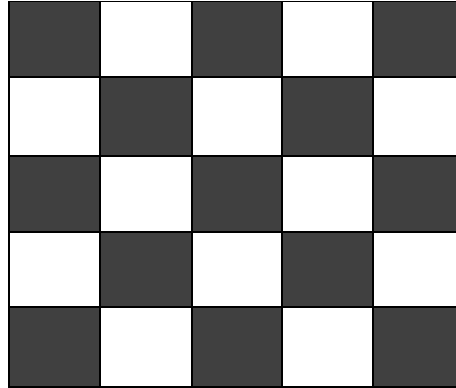
3. A checkered board alternates between light and dark squares, like the ones shown below.

4x4 Board

5x5 Board

Tiling is the process of laying down tiles on the board to cover it. You aren't allowed to overlap any of the tiles, and you must cover the whole board. On the two boards above, try to tile the board with 2x1 pieces, which look like this:

Can you cover both of the boards above with tiles? Why or why not?

4. Similar to above, try to tile a 4x4 and a 5x5 board, however this time removing two opposite corner squares. Should look like this:
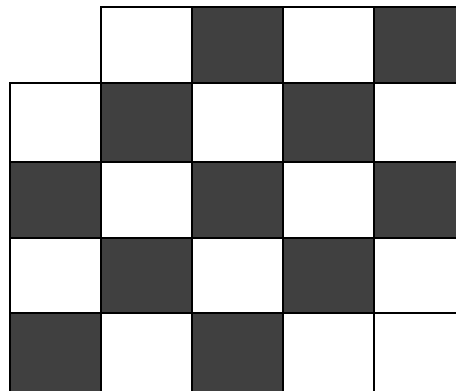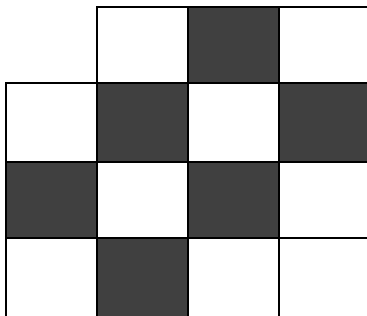
Can you cover both of the boards above with tiles? Why or why not?

Try to come up with a general rule for what boards can and can not be tiled.

If you finish early, try to come up with similar rules but for different tile sizes.(i.e. 3x1)