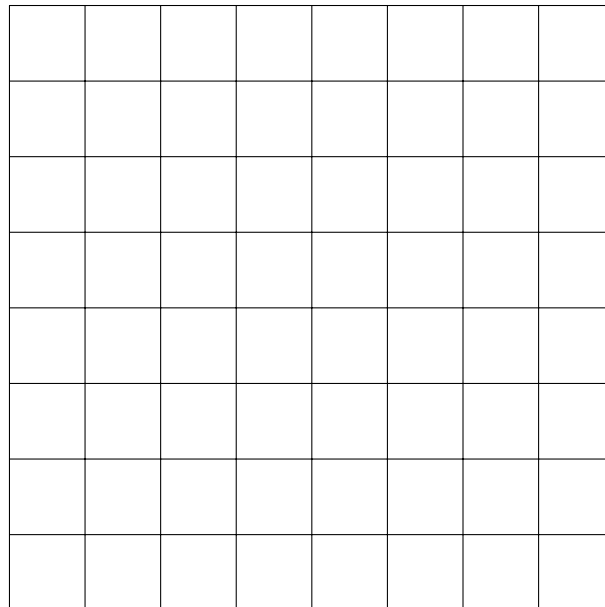


UW Math Circle
January 9, 2014

1. Kristin's sock drawer is full of striped, plaid, and solid colored socks. How many socks does she need to take from the drawer to guarantee that she has a pair with the same pattern?
2. There is a bird habitat at the zoo that is home to 17 different birds. The birds all have different colors, either green, red, blue, or yellow. Prove that there are at least five birds that all have the same color.
3. If there were 18 birds in the habitat instead, would that guarantee that there are six birds that all have the same color? How many birds would there have to be in order to guarantee that there are at least six birds of the same color?

4. Show that among any three integers, there are two whose sum is even.

5. What is the maximum number of bishops that can be placed on an 8×8 chessboard so that no two of them attack one another?



6. Every square of a 2014×2014 chessboard is colored one of 2013 colors. In a given row or column, if two squares have the same color, then the entire row/column can be recolored that color. Is it possible to make the entire board one solid color?

7. Show that if 20 numbers are chosen from the sequence $1, 4, 7, 10, 13, \dots, 94, 97, 100$, then there will be two of them that add up to 104.

8. 64 whole numbers are written on the squares of an 8×8 chessboard. It turns out that the sum of the numbers in every row is even and the sum of the numbers of every column is even. Show that the sum of the numbers on the black squares is also even.