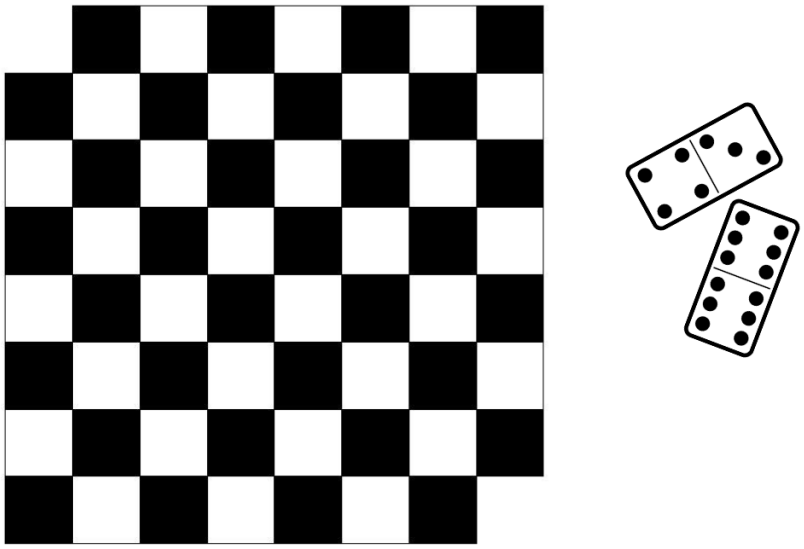
# Problem solving session

February 6, 2020

## The Mutilated Chessboard Problem

Suppose a standard $8 \times 8$ chessboard has two diagonally opposite corners removed, leaving 62 squares. Is it possible to place 31 dominoes of size $2 \times 1$ so as to cover all of these squares?



## Negative or Positive?

In the table below, in each move you may switch the signs of all the numbers in one row, one column, or one of the "big" diagonals. Prove that there will always be at least one negative number in the table.

| | | | |
|---|---|---|---|
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 |
| 1 | 1 | -1 | 1 |

## What about Tetrominos?

Prove that a $10 \times 10$ board cannot be covered by T-shaped tetrominos (shown below).