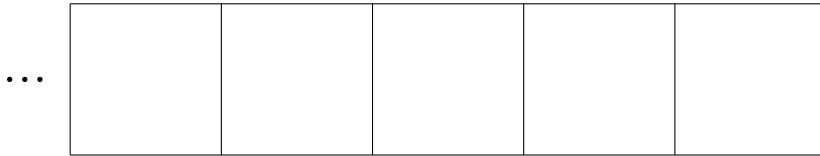


UW Math Circle  
October 26, 2017  
Homework

1. If we had a  $1 \leftarrow 3$  machine (like those from the class worksheet), what is the smallest positive number of dots I could put in the right-most box to make sure that the first three boxes had *no* dots after the explosions were done?



2. If the first three boxes were the only ones that could have dots in them after the explosions, what possible numbers of dots could I have started with?



3. If  $n$  is even, is it possible to cover an  $n \times n$  chessboard with the upper left and lower right corners removed with dominoes? Each domino covers exactly two squares and they cannot be stacked.

4. Can you find a integers  $x$  and  $y$  such that  $x^2 + y^2 = 71$ ? What about  $x^2 + y^2 = 73$ ?