

Question 4

If $x < y - 1$ or $x = y + 1$, player Row wins.

if $x > y + 1$ or $x = y - 1$, player Col wins.

If $x = y$ no one wins.

This encourages both Row and Col to pick small numbers, but they can't be too small.

When $n = 2$

Row

	1	2
1	0	-1
2	1	0

From these numbers, the optimal strategy is to always play 2, since you can't lose to the other player, either both people will lose, or you'll win.

When $n = 3$

Row

	1	2	3
1	0	-1	1
2	1	0	-1
3	-1	1	0

For $n=3$, there's no optimal single strategy. If you only play a single number, Col will win every time. If you only play two of the numbers, Col will win 2/3 the time. The smallest optimal strategy is to randomize equally between all three options.

When $n > 3$

Row

	1	2	3	4
1	0	-1	1	1
2	1	0	-1	1
3	-1	1	0	-1
4	-1	-1	1	0

Beyond, $n = 3$, there is no benefit to picking $x > 3$ since it's heavily skewed in the favor of the other player. Thus, you want to randomize between 1-3 equally.