# 11CSUR6

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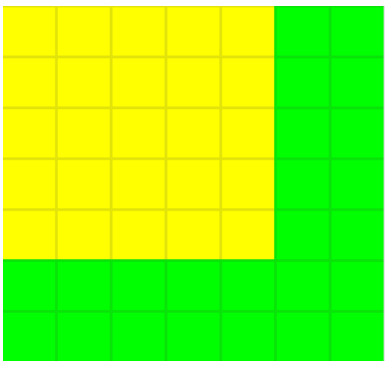
## §1 Solution

*Solution.* I claim the answer is $(2n+1)(n+1)$.
**Construction** is simple enough: color the board with black stripes alternately.
To prove this we will induct. Call the board $Q(n)$. Color $Q(n)$ as shown below, and call the yellow part $Q(n-1)$ and the green part $L(n-1)$.



Denote by $|Q(n)|, |L(n)|$ the maximum amount of black cells possible with the given coloring.
We know that

$$|Q(n)| \leq |Q(n-1)| + |L(n-1)|$$

.

**Claim 1.1** — $|L(n-1)| = 4n+1$

*Proof.* This is actually pretty easy just induct. □

Now we will finish, assume $|Q(n-1)| = (2(n-1)+1)((n-1)+1)$ note that

$$(2(n-1)+1)((n-1)+1) + (4n+1) = (2n+1)(n+1).$$

But that means $|Q(n)| \leq (2n+1)(n+1)$. So we are done.

□