Domination Chess Problems 2

In Domination Chess Problems 1 you were asked to find domination and total domination sets. Doing so, however, only establishes an upper bound on the domination or total domination number.

1. Argue why you cannot dominate a 3x12 board with 7 knights. Together with the domination of the 3x12 board with 8 knights from Domination Chess Problems 1 shows that $\gamma(N_{3,12}) = 8$.

2. Argue why you cannot dominate a 4x5 board with 3 knights. Together with the domination of the 4x5 board with 4 knights from Domination Chess Problems 1 shows that $\gamma(N_{4,5}) = 4$.

3. Argue why you cannot dominate a 3x6 board with 1 king. Together with the domination of the 3x6 board with 2 kings from Domination Chess Problems 1 shows that $\gamma(K_{3,6}) = 2$.

4. Argue why you cannot dominate a 4x9 board with 5 kings. Together with the domination of the 4x9 board with 6 kings from Domination Chess Problems 1 shows that $\gamma(K_{4,9}) = 6$.

5. Show that $\gamma(Q_{n+1,m+1}) \leq \gamma(Q_{n,m}) + 1$.