MAT 511 Fundamental Concepts of Math

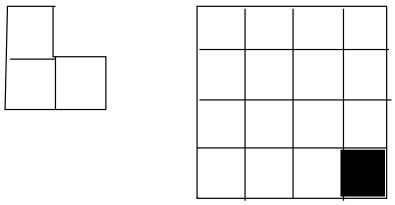
Problem Set 4

due Thursday, Oct 2

Please prove all your answers. Short and elegant proofs are encouraged but not required.

Problem 1. There are n straight lines on the plane, such that no two lines are parallel, and no three pass through the same point. Prove that these lines divide the plane into $\frac{n(n+1)}{2} + 1$ regions.

Problem 2. A corner 1×1 square is cut out of 64×64 board. Prove that the remaining board can be cut into L-shaped pieces of 3 unit squares each. (The picture below shows such a piece as well as 4×4 board with corner removed.) **Hint:** argue by induction, proving the statement for an $2^n \times 2^n$ board.



Please also do questions 8(dljrt) and 14 of §2.4 of *Eggen, Smith, St.Andre*.