

## Homework Assignment #7 – Due Wednesday 11/16

(1) Use the first principle of mathematical induction to show that

$$n! > 3^{n-1}$$

for all  $n \geq 5$ .

(2) An arrangement of lines  $\mathcal{L}$  in 2-dimensional plane is said to be in *general position* when

- every two lines in  $\mathcal{L}$  intersect and
- no three lines in  $\mathcal{L}$  intersect at some common point.

The collection  $\mathcal{L}$  divides the plane into regions, some of which are bounded by polygons and some of which are unbounded. Use the first principle of mathematical induction to show that  $\mathcal{L}$  defines

$$\frac{n^2 - 3n + 2}{2}$$

bounded regions in the plane.

(3) Use the second principle of mathematical induction to prove that every propositional-logic statement is logically equivalent to a propositional-logic statement that uses no connectors other than  $\vee$  and  $'$ .