Choose and prove ONE of the following using induction.

1) Let $a_1, a_2, \ldots, a_n$ be positive real numbers. Show that the arithmetic mean is larger than the geometric mean:

$$\frac{a_1 + a_2 + \cdots + a_n}{n} > (a_1 a_2 \cdot \cdots \cdot a_n)^{\frac{1}{n}}$$

2) Suppose that among n points, any three of them are contained in a circle of radius 1. Show that all n points are contained in a single circle of radius 1. n is at least 3.

3) Suppose there are n lines in a plane, no two of which are parallel and no three of which have a common point. Show that the plane is divided into $\frac{n^2+n+2}{2}$ regions.