Last name _____

First name _____

## LARSON—MATH 350—CLASSROOM WORKSHEET 26
### Geometry and Combinatorics

**Review**

- What does it mean for a figure to be *convex*?

- How many points of intersection do the diagonals of a convex $n$-gon have (inside the figure, assuming no 3 diagonals meet in the same point)? Can we make a conjecture? Can we prove it?

**Areas**

A collection of lines are in **standard position** if all lines intersect with all others (no parallel lines) and no more than 2 intersect at any point.

1. Draw a single line and count the regions formed by the line.

2. Draw two lines in standard position, and count the regions formed by the lines.

3. Draw three lines in standard position, and count the regions formed by the lines.

4. Draw four lines in standard position, and count the regions formed by lines.

5. Draw five lines in standard position, and count the regions formed by lines.

6. Make a table of your data.

7. Conjecture how many regions would be formed by $n$ lines in standard position.

8. Can we *prove* it?

   **Happy End Problem**

   For the following problems, **assume that no three points are on the same line**.

9. Show that for any 5 points in the plane, there are 4 which form a convex quadrilateral (4-gon).

10. Find 6 points in the plane, where no 5 of the points form a convex pentagon (5-gon).

11. Can you find 7 points in the plane, where no 5 of the points form a convex pentagon (5-gon)?