Exploration 9/Quiz 4

Math 2001–002, Fall 2016

September 23, 2016

Definition. For any integer $n \ge 0$, a general configuration of n lines in the plane (or just a configuration of lines for short) is a finite number of lines in the plane such that

Rule 1 no two of the lines are parallel, and

Rule 2 no three of the lines meet at a single point.

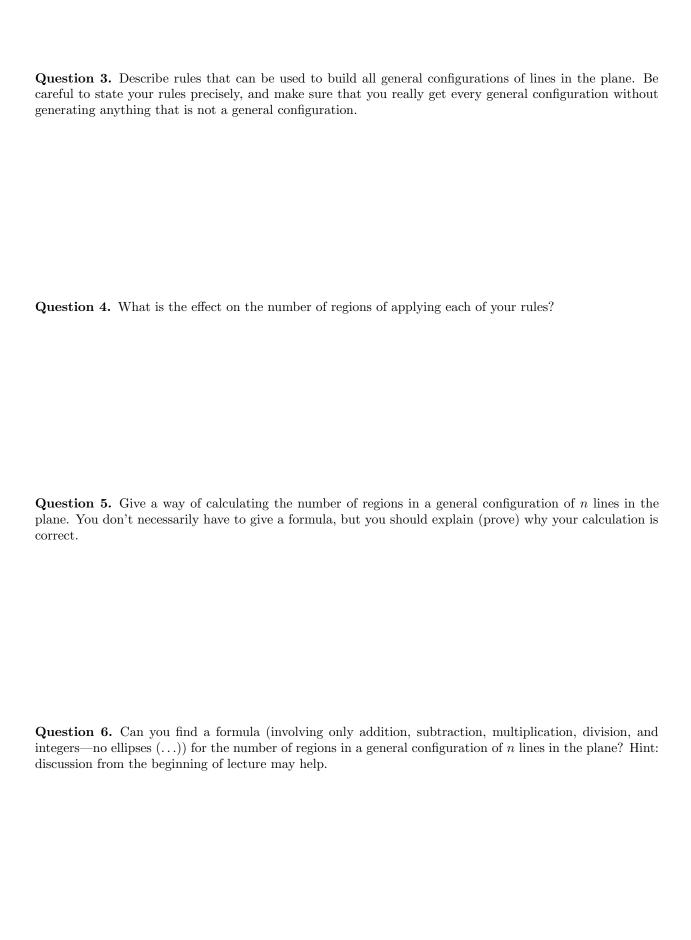
We say that two points are in the same *region* of the configuration if they are on the same side of every line in the configuration.

Question 1. Draw a collection of 4 lines that...

- (i) ...satisfies both Rule 1 and Rule 2.
- (ii) ...satisfies Rule 1 but not Rule 2.
- (iii) ...satisfies Rule 2 but not Rule 1.
- (iv) ...satisfies neither Rule 1 nor Rule 2.

Make sure you label which drawing is which!

Question 2. We want to know how many regions are formed by a general configuration of n lines. What kinds of things can we do to discover an answer to this question?



Question 7. Fill in the blank in the statement of the theorem and complete its proof.	
Theorem B. A general configuration of n lines in the plane has	$_$ regions.

Question 8. (Optional) What happens if Rule 1 or Rule 2 is suppressed? How will the formula for the number of regions change? You can be as detailed and rigorous as you would like on this question.