Math 431 Problem Set 2
Due 9/25

Reading: Chapter 2.

1. Two or more lines are said to be *concurrent* if there is exactly one point that lies on all of them. Prove that in incidence geometry, there exist three distinct lines that are not concurrent. This is Proposition 2.2 from the textbook.

2. Use the set of axioms which you devised during our class exercise to answer the following.

(a) Analyze your axioms and decide whether they are acceptable statements taking into consideration the undefined terms of our system (i.e. are you allowed to use the terms you used?) If the answer is yes, proceed to (b). If the answer is no, try to restate your axiom so that you retain its spirit, but use only allowed terms. If that is not possible state why it is not.

(b) Try to prove Proposition 2.4: For every point there is at least one line not passing through it. If you can not, explain why you can not and what you would need in order to continue. Can you change your axioms so that you can prove this statement?

3. In class we found an interpretation of the undefined terms of incidence geometry—point, line, and lie on—in which Axioms I-2 and I-3 are satisfied and Axiom I-1 is not satisfied.

(a) Find an interpretation of the undefined terms of incidence geometry in which Axioms I-1 and I-2 are satisfied and Axiom I-3 is not satisfied.

(b) Find an interpretation of the undefined terms of incidence geometry in which Axioms I-1 and I-3 are satisfied and Axiom I-2 is not satisfied.