

Math 431 Problem Set 1
Due 9/18

Reading: Read pages 10-14; 38- 51.

1. Use truth tables to verify the following:
 - (a) The negation of “if H then C ” is logically equivalent to “ H and not C ”. (This corresponds to Logic Rule 4.)
 - (b) The statement “if P then Q ” is logically equivalent to its contrapositive: “if not- Q then not- P ”. (This corresponds to Logic Rule 9(c).)
2. Write English sentences, in language as simple as possible, giving the negation of each axiom of incidence. Avoid the word “unique” in negating the first axiom.

The remaining problems ask for proofs. Use the proofs given in lecture as a guide for the style and level rigor.

3. Prove that in incidence geometry, for every line there is at least one point not lying on it.
4. Prove that in incidence geometry, for every point there is at least one line not passing through it.

Hint: Let P be a point. I-3 gives you three points R, S, T . Arbitrarily choose two of the three points, say R and S . There’s a line l through R and S (why?). Now l might or might not pass through P . If it doesn’t, you’re done. If it does, try a different line. Warning: P might or might not be one of the points R, S, T .

Instructions for homework groups: Each group should submit only one solution set. The solutions do not all have to be written by the same person, but everyone in the group will receive the same grade, and everyone in the group is expected to have made an honest attempt to solve every problem. I will expect you to email me your opinion on how your group worked together by the end of the day when the homework is due.