

Due February 10

Name

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use the results of discussion, a text, notes, or technology. **Only write on one side of each page.**

“Mathematicians do not study objects, but relations among objects; they are indifferent to the replacement of objects by others as long as relations do not change. Matter is not important, only form interests them.”

— Henri Poincaré

“Reductio ad absurdum, which Euclid loved so much, is one of a mathematician’s finest weapons. It is a far finer gambit than any chess play: a chess player may offer the sacrifice of a pawn or even a piece, but a mathematician offers the game.” – Godfrey H. Hardy

Required Problem

1. Formally prove **Proposition 2.5**. For every point P there exist at least two distinct lines incident with P .

Do any three of the following

Present a logical argument but **do not** formally prove.

1. For each pair of axioms of incidence geometry, construct an interpretation in which those two axioms hold but the third fails. (Exercise 7 page 64 of Greenberg)
2. Construct a model of incidence geometry for which **none** of the elliptic, hyperbolic, or Euclidean parallel properties hold. (Exercise 11 page 65 of Greenberg.)
3. Prove that in a finite projective plane that the lines through any point contain all the points of the model. Is this also true if the projective plane has an infinite number of points?
4. (Part of Exercise 10 page 65 of Greenberg) Prove or disprove: Any two four-point models of incidence geometry must be isomorphic.