MATH 406 Geometric Structures

Study Guide for Test #1

1.1.1 Using a compass and a centimeter ruler show how to use the Pythagorean method to find an approximation for $\sqrt{6}$.

1.2.1 Given the axioms for a finite geometry, like Systems 1, 2, 3, & 5, show that axioms are (a) consistent, (b) independent. (Fig. 1.2.3; Exercises 1.2: 5)

1.2.2 Given a consistent and independent axiom system for a finite geometry, determine whether or not some specified statements are true in the system. In case a given statement is false, provide a counterexample. In case a given statement is true, provide a proof. (Consider Axiom Systems 1, 2, 3, 5)

1.3.1 Define what we mean by "neutral geometry." Specify two distinctly different models for neutral geometry.

1.3.2 Prove the following theorems in an incidence geometry:

a. Two distinct lines cannot have more than one point in common.
b. If two lines intersect, then there is exactly one plane which contains them both.

1.3.3 Do the incidence axioms (axioms of connection) comprise a complete deductive system? (Justify your answer.)

1.3.4 Given a deductive system with the axioms of connection (incidence), order (betweensess), separation, congruence, and trichotomy prove the following theorems:

a. There exits an infinite number of points on each line.
b. If A-B-C and A-C-D, the A-B-C-D.
c. If A-B-C and segment AC is congruent to segment A'C', then there exists a point B' such that A'-B'-C' and segment AB is congruent to segment A'B'.

1.3.5 In synthetic geometry define: segment, ray, angle, vertex of an angle, interior of an angle, exterior of an angle, included angle, perpendicular, right angle.

1.3.6 Work all parts of Exercise 4-22 on the Hemmer handout on Euclidean Geometry.