Name:

Math 331 Exam 1

October 16, 2012

1) (10 points) Which of the following terms is *not* a primitive in Greenberg's axiomatic presentation of geometry? Circle your choices- there may be more than one!

a) Point

b) Congruent

c) Angle

d) Line

e) Plane

2) a) (9 points) State the three axioms of incidence geometry.

b) (6 points) What does it mean to be a "model" for incidence geometry?

3) (15 points) Let $S = \{1, 2, 3, 4\}$. Define "points" to be the subsets $\{1, 2\}$, $\{1, 3\}$, and $\{1, 4\}$ of S. Define "lines" to be the subsets $\{1, 2, 3\}$, $\{1, 3, 4\}$, and $\{1, 2, 4\}$ of S. Let "incidence" be set containment. Check which of the axioms of incidence geometry hold and determine whether this is a model for incidence geometry.

4) a) (6 points) State *two* of the betweenness axioms.

b) (6 points) Define what it means for two points A and B to be on the "same side" of a given line l if A and B are not incident to l.

5) a) (4 points) Define what it means for two lines l and m to be parallel.

b) (8 points) State the Hyperbolic, Elliptic, and Euclidean Parallel Properties for a geometry.

6) (12 points) Let $S = \{1, 2, 3, 4\}$. Define "points" to be the subsets $\{1\}$, $\{2\}$, $\{3\}$, and $\{4\}$ of S. Define "lines" to be the subsets $\{1, 2\}$, $\{1, 3\}$, $\{1, 4\}$, $\{2, 3\}$, $\{2, 4\}$ and $\{3, 4\}$ of S. Let "incidence" be set containment. Which, if any, of the Hyperbolic, Euclidean, or Elliptic parallel properties hold for the model? Show work to support your assertions.

7) a) (8 points) State *two* of the congruence axioms.

b) (6 points) If A, B, C, and D are points, define what $AB < CD$ means.

8) (20 points) If A, B, C, D, E, and F are points with $AB > CD$ and $CD \cong EF$, then $AB > EF$. You may employ the following result: If P, R, X and Z are points and $PR \cong XZ$, then if $P * Q * R$, there exists a unique Y, $X * Y * Z$ and $PQ \cong XY$.