

Homework

due on Monday, October 28

Read carefully sections 1-10 of Chapter 2 of Hartshorne's book. Solve problems 7.1, 7.10, 8.2, 9.1, 10.6, 10.9, 10.10. Also solve the following problems.

Problem 1. Consider an incidence geometry satisfying the betweenness axioms $B1 - B4$. Let A, B, C be points on a line l such that $A * B * C$ (i.e. B is between A and C). Let t_A, t_B, t_C be lines through A, B, C respectively such that t_A and t_B are parallel and distinct and t_C and t_B are parallel and distinct. Prove that t_A and t_C are parallel. Let m be a line intersecting lines t_A, t_B, t_C at points X, Y, Z respectively. Prove that $X * Y * Z$. Hint: Use sides of the line t_B .

Problem 2. A subset S of a plane satisfying incidence and betweenness axioms is called **convex** if for any two points X, Y in S the whole segment \overline{XY} is contained in S . In class we proved that a side of any line is a convex set.

- a) Prove that intersection of (any family of) convex sets is convex.
- b) Prove that any ray is a convex set.
- c) Prove that a segment, an interior of an angle, an interior of a triangle are convex (use a) and b)).