

## Reading

- Don Davis, *The Nature and Power of Mathematics*, Section 2.1 (pages 69-83).
- Stillwell, 18-18.1
- *Logicomix*, sections 1 and 2.

## Exercises

### Axiom Systems

- Davis, page 82-83, problems 4,5,6,7,8,9

### Projective Geometry

Consider these axioms for projective geometry. Undefined terms are *point* and *line*.

- (PG1) Any two distinct points lie on a unique line.
  - (PG2) Any two distinct lines meet in a unique point.
  - (PG3) There exist at least four points of which no three are on the same line.
1. Let ‘points’ refer to points in the plane, plus one extra point called  $\infty$ . Lines are the usual straight lines in the plane, with the extra stipulation that two parallel lines meet at  $\infty$ . Is this a model of projective geometry?
  2. Let ‘points’ refer to points in the plane, plus the interval  $C = [0, \pi)$ . Lines are the usual straight lines in the plane, with the extra stipulation that two parallel lines meet at  $\theta \in C$  where  $\theta$  is the angle the lines make with the  $x$ -axis. Is this a model of projective geometry?

### Parallel Postulate

Stillwell #18.1.1, 18.1.2, 18.1.3 (angle sums of triangles and quadrilaterals)

1. Derive a formula for the sum of angles in a polygon with  $n$  sides.
2. Assume absolute geometry. Prove these two statements are equivalent:
  - T1: All triangles have angle sum  $180^\circ$ .
  - T2: All right triangles have angle sum  $180^\circ$ .