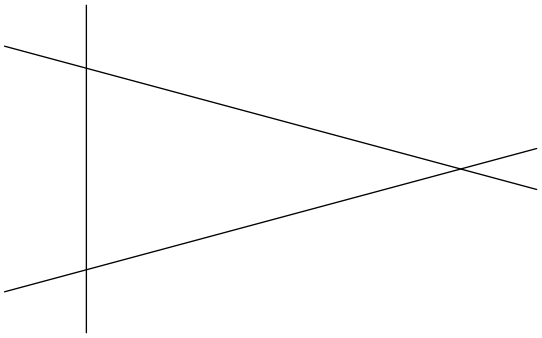
1 axioms

1.1 euclid's axioms

1. There is one line through any two distinct points.
2. There is one line containing any nondegenerate line segment.
3. For any point $p \in \mathbb{R}^2$ and any radius $r \in \mathbb{R}$, there is exactly one circle with center p and radius r.
4. All right angles are equal.
5. Suppose two lines cross an axis. If, on one side of the axis, the interior angles sum to under $\pi/2$, then the lines cross on that side.

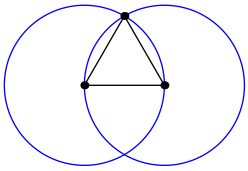
Figure 1.1: $\alpha + \beta < \pi/2$



Definition 1.1.1 (parallel postulate) For a line L and point $p \notin L$, there is one line through p parallel to L.

This ensures we are studying the Euclidean plane, *i.e.* $\mathbb{R}^2$.

1.2 constructions

Theorem 1.2.1 Every line segment is the leg of some equilateral triangle.

Proof. Start with the line segment: