Math 133
Fall 2021

MORE EXERCISES FOR WEEK 02

Assume that $(\mathbf{S};\mathcal{P};\mathcal{L};d;\alpha)$ or $(\mathbf{P};\mathcal{L};d;\alpha)$ is a system which satisfies the Incidence, Ruler, Plane or Space Separation (as appropriate), Angle Measurement and Triangle Congruence Axioms.

11. If $\triangle ABC$ and line L lie in the same plane, prove that their intersection cannot contain points in each of (AB), (AC) and (BC).

12. Suppose $\triangle ABC$ is an isosceles triangle with $|AC| = |BC|$, and let D and E denote the midpoints of $[AC]$ and $[BC]$ respectively. Prove that $\triangle DAB \cong \triangle EBA$.

13. Suppose that we are given $\triangle ABC$ with $B*A*D$ and $B*C*E$, and suppose that $X \in (AC)$. Prove that there is a point $Y \in (ED)$ such that $B*X*Y$.

14. Suppose we are given isosceles triangle $|\triangle ABC|$ in the plane with $|AB| = |AC|$, and let D be the midpoint of $[BC]$. Prove that the ray $[AD$ bisects $|\angle BAC|$: $|\angle BAD| = |\angle DAC| = \frac{1}{2}|\angle BAC|$.

15. Suppose that we are given points A, B, C, D in a plane such that A and D lie on opposite sides of BC and $|\angle ABC| = 180^\circ - |\angle DBC|$. Prove that A, B and D are collinear, and in fact $A*B*D$ holds.