

**COLLEGE GEOMETRY
HOMEWORK 3**

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Due February 20 by 8 a.m.

- (1) Give an example of a bijective function of a line to \mathbb{R} which is not a coordinate function.
- (2) If $A * B * C$ and $C * D * E$, is it necessarily the case that $B * C * D$?
- (3) Give an example why $A * B * D$ and $A * C * D$ does not imply $A * B * C * D$.
- (4) If $A * B * C * D$, show $AB + BC + CD = AD$.
- (5) Let A, B, C, D be collinear points satisfying $A * C * D$. If C is not between A and B , prove $B * C * D$.
- (6) Prove that every point lies on infinitely many distinct lines. (Hint: Start with a point and a line not containing it. Use the line to construct infinitely many lines going through the point.)
- (7) Let ℓ be line which includes a point A . Let r be a real number. Show that there are two points B and C on ℓ with $AB = AC = r$ and $B * A * C$.
- (8) Prove Euclid's Segment Cutoff Theorem: If \overline{AB} and \overline{CD} are segments with $CD > AB$, then there is a unique point E in the interior of \overline{CD} such that $\overline{CE} \cong \overline{AB}$.
- (9) Prove for distinct points A and B that
 - $\overrightarrow{AB} \cap \overrightarrow{BA} = \overleftrightarrow{AB}$ and
 - $\overrightarrow{AB} \cup \overrightarrow{BA} = \overleftrightarrow{AB}$