

Math 431 Homework 13 Extra Problems

Due 8 December 2008

- (1) Suppose that \mathcal{C} and \mathcal{C}' are circles with centres O and O' , respectively, such that the sum of the radii of \mathcal{C} and \mathcal{C}' is longer than $\overline{OO'}$; **the sum of the radius of \mathcal{C} and $\overline{OO'}$ is longer than the radius of \mathcal{C}' ; and the sum of the radius of \mathcal{C}' and $\overline{OO'}$ is longer than the radius of \mathcal{C} .** (These statements should be interpreted in the same “length-free” way as our description of the triangle inequality. See Exam 2.) Show that the circle-circle continuity principle implies that there are 2 distinct points that are incident with \mathcal{C} and \mathcal{C}' .
- (2) Use Problem 1 (and the circle-circle continuity principle) to show that every segment has a midpoint.
- (3) Suppose that A , B , and C are distinct, non-collinear points, and D is a point on the opposite side of \overleftrightarrow{AB} from C such that $\overline{BD} \cong \overline{AC}$ and $\sphericalangle BAC \cong \sphericalangle ABD$. Prove that there is a point M such that $A * M * B$ and $C * M * D$.