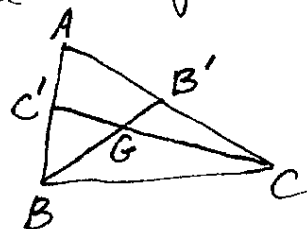


Math 130 Second Midterm
Fall 2002, H. Wu

1. (20%) A rhombus is a quadrilateral with four congruent sides. Prove that the diagonals of a rhombus are perpendicular to each other.

2. (25%) Assume you know that the line segment joining the midpoints of two sides of a triangle is parallel to the third side and is half the length of the third side.

Prove that if $\overline{BB'}$ and $\overline{CC'}$ are medians of $\triangle ABC$, then their point of intersection G satisfies $|\overline{BG}| = 2|\overline{GB'}|$, $|\overline{CG}| = 2|\overline{GC'}|$.



3. (30%) Assume you know that an isometry of \mathbb{R}^2 with three distinct ^{necessarily} fixed points is necessarily the identity map. Prove that every isometry of \mathbb{R}^2 is a bijection.

4. (25%) Given $\angle AOB$, where O is the origin of \mathbb{R}^2 . Let α, β be positive numbers and let $P = \alpha A + \beta B$. Prove that P is in the interior of $\angle AOB$. Is the positivity of α and β really necessary for this conclusion to hold?

