

Homework 2 Problem 2 Solution

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Problem 2.

Let the altitude from X to AB land at the point H_1 and the altitude to AC land at H_2 . Then, since X is in the angle bisector of $\angle BAC$ we know that $\angle XAH_1 = \angle XAH_2$. Also we know that $\angle XH_1A = \angle XH_2A$ since both XH_1 and XH_2 are altitudes. Then, since the sum of angle of every triangle is the same, we know that the third angles in triangle $\triangle XAH_1$ and $\triangle XAH_2$ are also equal, meaning that $\angle AXH_1 = \angle AXH_2$. Then by the ASA test using the facts that $\angle AXH_1 = \angle AXH_2$, $\angle XAH_1 = \angle XAH_2$ and $AX = AX$ we can conclude that $\triangle AXH_1 = \triangle AXH_2$. Then $XH_1 = XH_2$, and we are done.