

# Homework 2: More graphs and geometry

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**Problem 1.**

a) Let  $H$  be the foot of the altitude from  $A$  to the side  $BC$  of a triangle  $ABC$ . Assume that  $H$  is actually on the segment  $BC$ . Show that  $AB > BH$  and  $AC > CH$ . You can use the conclusions of all problems from last class.

b) Prove the *triangle inequality*: In a triangle  $ABC$  we have  $BA+AC > BC$ .

**Problem 2.**

Let  $\ell$  be the angle bisector of  $\angle ABC$ , and  $X$  be any point on  $\ell$ . Show that the length of the altitude from  $X$  to the line  $AB$  is the same as to the line  $AC$ .

**Problem 3.**

Is it true that in any group of 7 people there are either 3 people who all know each other, or 4 people all of whom don't know each other?