Mathematics 2260H – Geometry I: Euclidean geometry
TRENT UNIVERSITY, Winter 2013

Assignment #5
Triggy business with similarity
Due on Friday, 15 February, 2013.

Recall from the previous assignment that $\triangle ABC$ and $\triangle DEF$ are *similar*, denoted by $\triangle ABC \sim \triangle DEF$, if the ratios of the lengths of corresponding sides are all the same, that is, if $\frac{|AB|}{|DE|} = \frac{|BC|}{|EF|} = \frac{|AC|}{|DF|}$.

Two handy facts about triangles, if one has trigonometry in hand, are:

THE LAW OF SINES: In any triangle $\triangle ABC$,

$$\frac{\sin(\angle BAC)}{|BC|} = \frac{\sin(\angle ACB)}{|AB|} = \frac{\sin(\angle ABC)}{|AC|} .$$

and

THE LAW OF COSINES: In any triangle $\triangle ABC$,

$$|AC|^2 = |AB|^2 + |BC|^2 - 2 \cdot |AB| \cdot |BC| \cdot \cos(\angle ABC) .$$

You may use these laws, and whatever else you know or learn about the trigonometric functions, to help do the following problems.

1. Show that if $\angle BAC = \angle EDF$ and $\frac{|AB|}{|DE|} = \frac{|AC|}{|DF|}$, then $\triangle ABC \sim \triangle DEF$. *[4]*

NOTE: That is, show that a Side-Angle-Side (SAS) similarity criterion for triangles works.

2. State and prove a Side-Side-Side (SSS) criterion for similarity. *[2]*

3. If $\triangle ABC \sim \triangle DEF$, then $\angle ABC = \angle DEF$, $\angle BCA = \angle EFD$, and $\angle CAB = \angle FDA$. *[4]*

NOTE: That is, show that in similar triangles corresponding angles are equal.

□. This is unquestionably a non-question! *[0]*