MATH 341 — FALL 2011
ASSIGNMENT 4

September 21, 2011

Geometry for College Students by Martin Isaacs, page 23:

1E.1 Draw two medians of a triangle. This subdivides the interior of the triangle into four pieces: three triangles and a quadrilateral. Show that two of the three small triangles have equal areas and that the area of the third is equal to that of the quadrilateral.

1E.2 An arbitrary point P is chosen on the base BC of an isosceles $\triangle ABC$ and perpendiculars PU and PV are drawn from P to the other two sides of the triangle. (It may be that U or V lies on an extension of AB or AC and not on the actual side of the triangle. This can happen, for instance, if $\angle A$ is obtuse and point P is very near B or C.) Show that the sum $PU + PV$ of the lengths of the two perpendiculars is constant as P move along BC. In other words, this quantity is independent of the choice of P.

1E.3 Since a triangle is determined by angle-side-angle, there should be a formula for K_{ABC} expressed in terms of a and $\angle B$ and $\angle C$. Show that:

$$K_{ABC} = \frac{1}{2}a^2\frac{\sin B \sin C}{\sin(B+C)}.$$