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# Ceva, Menelaus, and Their Ilk

## Abstract for the Combinatorics Seminar 2011 November 8

The theorem of Menelaus (1900+ years B.P.) is an algebraic characterization of when three points, one on each edge line of a triangle, are collinear. The theorem of Ceva (300 or 900 years B.P.) is a similar characterization of when three lines, one through each vertex of a triangle, are concurrent. (A particular case is concurrence of the median lines. A Ceva-like result generalizes concurrence of the angle bisectors.) A theorem without a name (> 100 years B.P.) characterizes when three perpendiculars erected on the edge lines are concurrent. (A particular case is concurrence of the perpendicular bisectors.)

I will treat these theorems and higher-dimensional generalizations as applications of gain graphs to geometry.

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