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## **PERPENDICULARITY IN GEOMETRY.**

Searching for a minimal and sufficient set of primitive notions in geometry is a very old problem which probably has been arised by Euclid in his Elements. A question that is often asked in geometry is whether we really need both a ruler and compasses to solve a specific problem. Maybe a ruler alone or another set of simple tools is sufficient. Observe that we do not need both perpendicularity of lines and congruence of line segments. One of them is sufficient as given a perpendicularity we can define congruence by the use of fact that diagonals of a rectangle are congruent.

One of classic, more advanced, results says that the relation of line intersection is enough to axiomatize both affine and projective geometry. Another result that might be of interest says that an Euclidean and hyperbolic geometry can be characterized in terms of line tangency to a sphere.

There is a number of papers, some older other newer, devoted to investigations of perpendicularity of lines as a single primitive notion for Euclidean, elliptic and hyperbolic geometry. In my research I deal with perpendicularity or orthogonality of subspaces in various geometries: Euclidean, elliptic and hyperbolic. Frankly speaking it turns out that such an orthogonality of subspaces can be used as a single primitive notion for those geometries.

I am also considering perpendicularity of lines in a more general context, namely in metric-affine geometry. My results are related to those by Benz, Szczerba, Schwabhäuser, and Kramer.