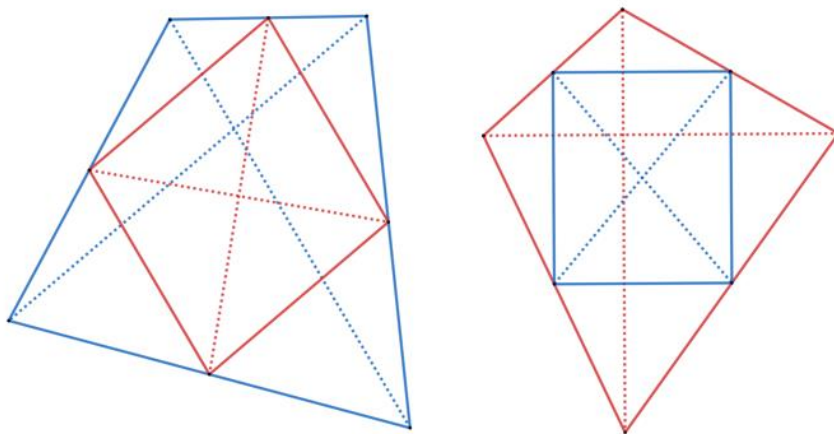


### 4.3.6 Duals by the midpoint construction

In the section **Dual polygons** we obtained a dual via an intermediate circle. Another way is to take as vertices of quadrilateral  $X$  the side midpoints of quadrilateral  $Y$ . This gives a parallelogram in all cases, the *Varignon parallelogram*. An interesting duality exists between the *equidiagonal* quadrilateral and the *orthodiagonal* quadrilateral.

A quadrilateral is *equidiagonal* if and only if the Varignon parallelogram is *orthodiagonal* (a rhombus).

A quadrilateral is *orthodiagonal* if and only if the Varignon parallelogram is *equidiagonal* (a rectangle).



If a quadrilateral is both ortho- and equidiagonal, the Varignon parallelogram must be both a rhombus and a rectangle, that is, a square.