i.e., when
$$(Q'x, Q^{-1}Q'x) = (Q'Q^{-1}Q'x, x) = 0.$$

⌈ $g_F(x) = Q'x \in G^*$
$\Rightarrow (Q'x, Q^{-1}Q'x) = 0 = (Q^{-1}Q'x, Q'x)$
$= ({}^tQ' Q^{-1}Q'x, x) = (Q'Q^{-1}Q'x, x)$, since Q' is symmetric. ⌋

The surface $\Sigma \subset X$ is thus cut out by the quadric hypersurface
$$H = ((Q'Q^{-1}Q'x, x) = 0).$$

⌈ By the lemma and the argument above on P767, $\Sigma = H \cap X$.
⌋

We claim now that in fact the intersection
$$\Sigma = F \cap G \cap H$$
is everywhere transverse. To see this, suppose that for some $x \in F \cap G \cap H$ the hyperplanes $T_x(F)$, $T_x(G)$, and $T_x(H)$ were linearly dependent, i.e., that the points
$$g_G(x) = Qx, \quad g_F(x) = Q'x, \text{ and } g_H(x) = Q'Q^{-1}Q'x$$
in $\mathbb{P}^{5*}$ lay on a line.

⌈ $\exists\, a, b, c \in \mathbb{C}$ s.t $aQx + bQ'x = cQ'Q^{-1}Q'x$ if the hyperplanes are linearly dependent. ⌋

The three points