How much should we write when describing constructions? We answer by example, with reference to HW8. If at any point we can rely on previously known constructions (such as constructing the center of a given circle $\gamma$, if it is not already given) then we may certainly do so.

**Discussion of HW8**

Let $\gamma$ be a circle in the Euclidean plane, and let $P$ be a point exterior to $\gamma$. We may construct the two tangents $PT$ and $PT'$ from $P$ to $\gamma$ as follows: Let $O$ be the center of $\gamma$. (If $O$ is not given, it may be easily constructed by randomly choosing two chords of $\gamma$, then constructing the right bisectors of these two chords; and then intersecting these two right bisectors.) Let $\beta$ be the circle with diameter $OP$. (This circle has center $M$ equal to the midpoint of $OP$, and radius equal to $OM = MP$.) Now the required points $T, T'$ of tangency are the two points of intersection of $\beta$ and $\gamma$.

The reason this works is that $OP$ is a diameter of the circle $\beta$, so by a theorem discussed in class, the angle subtended by $OP$ from the point $T$ (or $T'$) is a right angle; thus $PT$ is perpendicular to the radius $OT$, i.e. $PT$ is tangent to $\gamma$ at $T$. Similarly, $PT'$ is tangent to $\gamma$. 
You are given three distinct collinear points $P$, $P'$ and $X$, as shown. Show how to construct the unique circle $\gamma$ which is orthogonal to every circle through $P$ and $P'$ (including the line $PP'$, which we think of as a circle of infinite radius). You may use the fact that if $\gamma$ is orthogonal to two of the circles through $P$ and $P'$, then it is orthogonal to every circle through $P$ and $P'$; we will soon explain why this is true.