Let $A = k[x,y]/(y^2 - x^2(x-1))$, and let $X = \operatorname{Spec} A$. Let $\mathfrak{p} = (x,y)$, let $\mathfrak{q} = (x-1,y)$, and let P and Q be the corresponding points. Recall that localization commutes with taking quotients. Then:

$$\begin{aligned}
\mathcal{O}_{X,P} &= A_{\mathfrak{p}} \\
\mathfrak{m}_P &= (x,y)A_{\mathfrak{p}} \\
\mathfrak{m}_P/\mathfrak{m}_P^2 &= \frac{(x,y)\left(\frac{k[x,y]}{(y^2-x^2(x-1))}\right)_{(x,y)}}{(x^2,xy,y^2)\left(\frac{k[x,y]}{(y^2-x^2(x-1))}\right)_{(x,y)}} \\
&\cong \frac{(x,y)k[x,y]_{(x,y)}}{(x^2,xy,y^2,y^2-x^2(x-1)} \\
&\cong kx \oplus ky \text{ as } \kappa(P) = k \text{ module}
\end{aligned}$$

while

$$\begin{aligned}
\mathcal{O}_{X,Q} &= A_{\mathfrak{q}} \\
\mathfrak{m}_Q &= (x-1,y)A_{\mathfrak{q}} \\
\mathfrak{m}_Q/\mathfrak{m}_Q^2 &= \frac{(x-1,y)\left(\frac{k[x,y]}{(y^2-x^2(x-1))}\right)_{(x-1,y)}}{((x-1)^2,(x-1)y,y^2)\left(\frac{k[x,y]}{(y^2-x^2(x-1))}\right)_{(x-1,y)}} \\
&\cong \frac{(x-1,y)k[x,y]_{(x-1,y)}}{((x-1)^2,(x-1)y,y^2,y^2-x^2(x-1))}
\end{aligned}$$

But x^2 is a unit after localization at $(x-1,y)$, thus

$$\begin{aligned}
&\cong \frac{(x-1,y)k[x,y]}{(x-1)^2,(x-1)Y,y^2,(x-1)} \\
&\cong ky
\end{aligned}$$

Take $k = \mathbb{R}$, and graph X, P and Q.