

$$\begin{aligned}
 & \mathbb{P} \left(\left\{ \begin{array}{l} Y=y, \nabla Y=0, \nabla^2 Y=y'' \\ X^2=y \end{array} \right\} \right) \\
 &= \mathbb{P} \left(\left\{ Y=y, X=0, \nabla^2 Y=y'' \right\} \cup \left\{ Y=y, X'=0, \nabla^2 Y=y'' \right\} \right) \\
 & \mathbb{P} \left(\left\{ X^2=y, 2XX'=0, 2X'^2+2XX''=y'' \right\} \right)
 \end{aligned}$$

$$\begin{aligned}
 &= \mathbb{P} \left(\left\{ X^2=y, X=0, 2X'^2+2XX''=y'' \right\} \right. \\
 & \quad \left. \cup \left\{ X^2=y, X'=0, 2X'+2XX''=y'' \right\} \right)
 \end{aligned}$$

If $y > 0$ then $\{X^2=y, X=0, 2X'^2+2XX''=y''\} = \emptyset$

so this equals $\mathbb{P} \left(X^2=y, X' \neq 0, X'=0, 2XX''=y'' \right)$