$\left.\frac{\partial \Delta}{\partial y}\right|_{(0,0)} = be$, since we have only to consider the y^3 term.

$\Delta(0,0) = b^2$

$$= \frac{P_y(0)}{f_y(0)^2} - \frac{P(0)\,e}{b^3} = \frac{P_y(0)}{f_y(0)^2} - \frac{P(0)\,f_{yy}(0)}{f_y(0)^3},$$

from $f(x,y) = ax + by + \frac{cx^2}{2} + dxy + \frac{ey^2}{2}$, $\left.\frac{\partial^2 f}{\partial y\partial y}\right|_{(0,0)} = e$
$f_y(0) = b$

On the basis of the lemma and elementary fiddling around, if we take

$$p = f_x^2 - f f_{xx},$$

then

$$\operatorname{Res}_{\{0\}}\left(\frac{p(x,y)\,dx\wedge dy}{x\,f(x,y)^2}\right) = -\frac{(f_{xx}f_y^2 - 2f_{xy}f_xf_y + f_{yy}f_x^2)}{f_y^3}.$$

Applying the residue theorem in the form (*) gives the Reiss relation. Q.E.D.

$$P_y = 2f_x f_{xy} - f_y f_{xx} - f f_{xxy}$$

$\Rightarrow$ $P_y(0) = 2f_xf_{xy} - f_yf_{xx}$ since $f(0) = 0$.

$$\Rightarrow \operatorname{Res}_{\{0\}}\left(\frac{P(x,y)\,dx\wedge dy}{x\,f(x,y)^2}\right) = \frac{P_y(0)}{f_y^2} - \frac{P(0)\,f_{yy}(0)}{f_y^3}$$

$$= \frac{f_y(2f_xf_{xy} - f_yf_{xx}) - f_x^2 f_{yy}}{f_y^3} = -\frac{(f_{xx}f_y^2 - 2f_{xy}f_xf_y + f_{yy}f_x^2)}{f_y^3}$$

Applying the residue theorem in the form (*) (on P671) gives the Reiss relation.