$\Rightarrow \partial g/\partial w_0 \neq 0$ at $(0, \frac{p_2}{p_1})$ since S is smooth.

$\Rightarrow \exists$ a holomorphic function h locally s.t $h(\frac{p_2}{p_1}) = 0$ and $g(h(w_2), w_2) = 0$, by the implicit function theorem.

$\Rightarrow \quad \frac{\partial g}{\partial w_0} \frac{\partial h(w_2)}{\partial w_2} + \frac{\partial g}{\partial w_2} \equiv 0$ by the chain rule

on some open set around $(0, \frac{p_2}{p_1})$.

$\Rightarrow$ Since $\frac{\partial g}{\partial w_2}(0, \frac{p_2}{p_1}) = 0$, and $\frac{\partial g}{\partial w_0}(0, \frac{p_2}{p_1}) \neq 0$,

$\frac{\partial h}{\partial w_2}(\frac{p_2}{p_1}) = 0$.

$\Rightarrow$ Since $w_2 \longmapsto (h(w_2), w_2)$ gives an biholomorphic map between $\mathbb{C}$ and $S^{(U_1 \equiv \mathbb{C}^2)}$ around $(0, \frac{p_2}{p_1})$,

$\frac{\partial}{\partial w_2}$ corresponds to $\frac{\partial h}{\partial w_2} \frac{\partial}{\partial w_1} + \frac{\partial}{\partial w_2}$.

$\Rightarrow$ At $\frac{p_2}{p_1}$. it corresponds to $\frac{\partial}{\partial w_2}$. which corresponds to a tangent vector lying in $(Z_0 = 0)$, since $(Z_0 = 0)$ corresponds to $\{(0, w_2)\}$.

Thus we can conclude that $L = (Z_0 = 0)$ is tangent to S at p, i.e., $(0, \frac{p_2}{p_1})$.

This contradicts to the assumption above.

$\Rightarrow$ All points of $S \cap (\partial F/\partial Z_2 = 0)$ lie in the finite plane $(Z_0 \neq 0)$.

$\Rightarrow$ We have only to consider our problem on $(Z_0 = 0)$.

We know from the above ① $\partial f/\partial z_2 \neq 0$. $\Rightarrow$ unramified.

② $\partial f/\partial z_2 (q) = 0$, $\Rightarrow$ $v(q) - 1$ = multiplicity of $(S \cap (\partial f/\partial z_2 = 0))$ at q.

$\Rightarrow$ We get $\sum (v(q) - 1) = \#(S \cdot (\frac{\partial f}{\partial z_2} = 0)) = d(d-1)$.