$\Rightarrow$ By the inverse function theorem, $\exists$ G s.t

$G(z_1, z_2, f, g) = (z_1, z_2, z_3, z_4)$.

$\Rightarrow$ $G(z_1, z_2, 0, 0) = (z_1, z_2, z_3, z_4)$.

$\Rightarrow$ $z_3 = h(z_1, z_2)$, $z_4 = k(z_1, z_2)$, locally.

$\Rightarrow$ This proves $\underset{V}{\underset{\parallel}{\{f = g = 0\}}} \longrightarrow \pi(V) \xrightarrow{\pi} \mathbb{C}$ is

a branched finite-sheeted covering map.

In case $\left(\frac{\partial f}{\partial z_4}, \frac{\partial g}{\partial z_4}\right) = 0$, we will deal a little bit later.

② $D(\gamma) \equiv 0$.

$\Rightarrow$ Since γ is a Weierstrass polynomial, γ is of form $(z_3^{\circ} \cdots)^{2}(z_3 \cdots)\cdots$.

For example, $\gamma = (z_3^2 + \quad)^2(z_3^4 + \cdots)$.

Since $\{\gamma = 0\} = \{(z_3^2 + \cdots)(z_4^{\,4} + \cdots) = 0\}$,

$\pi\{f = g = 0\} = \{(z_3^2 + \cdots)(z_4^4 + \cdots) = 0\}$.

$\Rightarrow$ We may assume γ has $D(\gamma) \not\equiv 0$.

$\Rightarrow$ For $(z_1^{\circ}, z_2^{\circ}) \in \{D(\gamma) \neq 0\}$, locally

$\exists$ $z_3 = h(z_1, z_2)$ s.t $\gamma(z_1^{\circ}, z_2^{\circ}, z_3^{\circ}) = 0$ and $z_3^{\circ} = h(z_1^{\circ}, z_2^{\circ})$.

$\Rightarrow$ $f(z_4) = z_4^4 + a_1(z_1, z_2, h(z_1,z_2))\, z_4^3 + a_2(z_1, z_2, h(z_1,z_2))\, z_4^2 + a_3(z_1, z_2, h(z_1,z_2))\, z_4 + a_4(z_1, z_2, h(z_1,z_2))$

$g(z_4) = z_4^3 + b_1(z_1, z_2, h(z_1,z_2))\, z_4^2 + b_2(z_1, z_2, h(z_1,z_2))\, z_4 + b_3(z_1, z_2, h(z_1,z_2))$,

around $(z_1^{\circ}, z_2^{\circ}) \in \{D(\gamma) \neq 0\} \subset \mathbb{C}^2$.