and

$$K(0,0) \neq 0.$$

$$df_i = (dz_1)\, K + z_1\, dK$$

$$\Rightarrow \frac{df_i}{f_i} = \frac{dz_1}{z_1} + \frac{dK}{K}.$$

$$\Rightarrow \frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \frac{df_i}{f_i} = \frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \frac{dz_1}{z_1} + \cancel{\frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \frac{dK}{K}}^{\,20}$$

$$= 1.$$

$$\frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \varphi = \frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \frac{h'(z_1, z_2)}{z_1\, K(z_1, z_2)}\, dz_j$$

$$= \frac{h'(z_{01}, z_{02})}{K(z_{01}, z_{02})}, \quad K(z_{01}, z_{02}) = \lim_{z \to z_0} \frac{f_i(z_1, z_2)}{z_1}$$

Note that $\int_{\gamma_i} \varphi$ is independent of the parametrization.

$$\Rightarrow \frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \psi = \frac{1}{2\pi\sqrt{-1}} \int_{\gamma_i} \varphi - \sum \lambda_i \frac{df_i}{f_i}$$

$$= \lambda_i - \lambda_i \int_{\gamma_i} \frac{df_i}{f_i} = \lambda_i - \lambda_i = 0.$$

$\Rightarrow$ Since any $\gamma \in H_1(W^*, \mathbb{Z})$ is a linear combination of γ_i's, ψ has no residues.
$\Rightarrow$ We can define g by $\int \psi$ since ψ has no residues on W^*. $\Rightarrow$ $g = \int \psi$ is meromorphic on W since ψ is meromorphic in W, and g is holomorphic in W^* $\Rightarrow$ $\varphi - \sum_i \lambda_i \frac{df_i}{f_i} = \psi = dg$. $\lrcorner$