$= 2\pi\sqrt{-1}\ \sum \mathrm{ord}_{p_i}(f)\ \log g(p_i)$, since by P222, $\sum_{p_i} \mathrm{ord}_{p_i}(f)$
$= \sum_i \mathrm{Res}_{p_i}(d\log f) = 0.$

In sum, we have

$$2\pi\sqrt{-1}\ \left(\sum \mathrm{ord}_{q_i}(g)\cdot \log f(q_i) - \sum \mathrm{ord}_{p_i}(f)\cdot \log g(p_i)\right)$$

$$= \sum_{i=1}^{g} \left(\left(\int_{\delta_i} d\log f\right)\left(\int_{\delta_{g+i}} d\log g\right) - \left(\int_{\delta_i} d\log g\right)\left(\int_{\delta_{g+i}} d\log f\right)\right).$$

Γ By considering the meromorphic differential

$$\psi = \log g \cdot d\log f.$$

as we did for φ, (of course, we have to draw arcs β_i from s_0 to q_i as we did for α_i.), we get

$$\sum_i \int_{\beta_i+\beta_i^{-1}} \psi = 2\pi\sqrt{-1}\ \sum \mathrm{ord}_{q_i}(g)\cdot \log f(q_i).$$ and

so on.

$$2\pi\sqrt{-1}\ \left(\sum \mathrm{ord}_{q_i}(g)\cdot \log f(q_i) - \sum \mathrm{ord}_{p_i}(f)\cdot \log g(p_i)\right)$$

$=?$

$$0 = \sum \int_{\delta_i+\delta_i^{-1}} \varphi + \int_{\delta_{g+i}+\delta_{g+i}^{-1}} \varphi + \int_{\alpha_i+\alpha_i^{-1}} \varphi$$

$$= -\sum\left(\int_{\delta_i} d\log g\right)\left(\int_{\delta_{g+i}} d\log f\right) + \sum\left(\int_{\delta_{g+i}} d\log g\right)\left(\int_{\delta_i} d\log f\right)$$

$$+\ 2\pi\sqrt{-1}\ \sum \mathrm{ord}_{p_i}(f)\cdot \log g(p_i) \quad\text{—— ①}$$