If $f(p) \notin \{p_i'\}$, $\mathrm{ord}_{f(p)}(\omega) = 0$.
If $f(p) \in \{p_i'\}$, say $f(p) = p_1'$, $\Rightarrow$ $\mathrm{ord}_{f(p)}(\omega)$
$= \mathrm{ord}_{p_1'}(\omega) = a_1$ $\Rightarrow$ $v(p)\, a_1 \cdot p$.

$$\Rightarrow \sum_{p \in f^{-1}(p_1')} v(p) \cdot a_1 \cdot p = a_1 f^*(p_1') = f^*(a_1 p_1').$$

Thus $\displaystyle\sum_{p \in S} v(p) \cdot \mathrm{ord}_{f(p)}(\omega) \cdot p$

$$= f^*\left(\sum a_i p_i'\right) = f^*(\omega).$$

$$\Rightarrow (f^*\omega) = f^*(\omega) + \sum_{p \in S} (v(p)-1) \cdot p$$

$$\Rightarrow \underset{[(f^*\omega)]}{\underset{\swarrow}{K_S}} = \underset{[f^*(\omega)]}{\underset{\Downarrow}{f^* K_{S'}}} + \underset{[(\sum (v(p)-1)\cdot p)].}{\underset{\searrow}{B}}$$

$$\Rightarrow \deg K_S = \underset{n \cdot \deg K_{S'}}{\underset{\|}{\deg(f^* K_{S'})}} + \deg([B]).$$

$$\left(\because \deg(f^* K_{S'}) = \int_S f^*\left(\frac{i}{2\pi}\Theta\right) = n \int_{S'} \frac{i}{2\pi}\Theta \right.$$

$$\left. = n \deg K_{S'} \right)$$

$$\deg([B]) = \sum_{p \in S} (v(p)-1) \quad \text{by } P217, \ \& \ P144.$$

$$\Rightarrow \deg K_S = \deg K_{S'} \cdot n + \sum_{p \in S} (v(p)-1).$$

Now any compact Riemann surface S admits a holomorphic map to $\mathbb{P}^1$: if $f \in \mathcal{M}(S)$ is any global meromorphic function written locally as g/h with g, h