Date

the first and second kind:

$$\sum_{i=1}^{g} (\Pi^i N^{g+i} - \Pi^{g+i} N^i) = 2\pi\sqrt{-1} \sum_{P,j} \frac{a^P_{-j}\, b^P_{j-2}}{j-1}.$$

The two reciprocity laws stated are the only ones we shall use in our discussion of curves. It should be pointed out, however, that more general laws can be obtained in the same way with little additional effort. For example, in either of the two formulas given, we may take ω to be a differential of the second kind: the function

$$\pi(s) = \int_{s_0}^{s} \omega$$

will then be meromorphic but still well-defined, and again we will have

$$\sum (\Pi^i N^{g+i} - \Pi^{g+i} N^i) = 2\pi\sqrt{-1} \sum_{P} Res_P(\pi \cdot \eta).$$

Γ Since ω has no residue, i.e., $\int_{B_\varepsilon(p)} \omega = 0$ for a singular point p of ω,

$\pi(s) = \int_{s_0}^{s} \omega$ is well-defined. ⅃

Similarly, a reciprocity law for a pair of differentials of the third kind can be proved if we excise some additional arcs from our region Δ. We will not derive all these formulas — the general formalism should by now be evident — but we will menti-