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and observation that we may find $\varphi \in H^0(\mathcal{O}_c(K+2D))$ with prescribed residue subject only to the residue theorem (cf. Section 2 in Chapter 2).

⌈ Consider the following map

$$\begin{array}{ccc} H^0(M, \Omega^1(2D)) & \xrightarrow{f} & \mathbb{C}^g \\ \varphi & \longmapsto & (\mathrm{Res}_{p_1}\varphi, \mathrm{Res}_{p_2}\varphi, \cdots \mathrm{Res}_{p_g}\varphi) \end{array}$$

In case $P_1 \cdots P_g$ are distinct, the result on P460 above is true. According to P233 lemma,
$\exists$ a meromorphic function $\tilde{\varphi}$ on M, holomorphic on $M - \{P_1 \cdots P_g\}$, and residue a_λ at P_λ. $\sum a_\lambda = 0$.
$\Rightarrow$ $s_0^2 \tilde{\varphi} \in \Omega^1(2D)$, where $D = (s_0 = 0)$.
$\Rightarrow$ $s_0^2 \tilde{\varphi} \in H^0(M, \Omega^1(2D))$.
Thus, dimension of $\operatorname{im} f = g-1$, since f is onto the hyperplane $\sum a_\lambda = 0$ of $\mathbb{C}^g$.
$\Rightarrow$ $\dim \ker f = \dim H^0(M, \Omega^1(2D)) - \dim \operatorname{im} f$
$= h^0(K_c + 2D) - (g-1) = 3g-1-(g-1) = 2g$.
$\Rightarrow$ Note that $\ker f$ = the set of all meromorphic 1-forms having no residues and polar divisor $2D$. ⌋

So the space of 1-forms of the second kind with polar divisor $2D$ has dimension

$$3g-1-(g-1) = 2g,$$

and none of these can be exact by our remark about meromorphic functions with polar divisor D. Q.E.D.