Kittel TP

6.1. $-\frac{\partial f}{\partial \varepsilon}\Big|_{\varepsilon=\mu} = (4\tau)^{-1}$?

We have $f(\varepsilon) = [\exp((\varepsilon-\mu)/\tau) + 1]^{-1}$

$$\frac{\partial f}{\partial \varepsilon} = [\exp[(\varepsilon-\mu)/\tau] + 1]^{-2} \frac{1}{\tau} \exp[(\varepsilon-\mu)/\tau]$$

$$= \frac{\exp[(\varepsilon-\mu)/\tau]}{\{\exp[(\varepsilon-\mu)/\tau]+1\}^2} \frac{1}{\tau}.$$

$$-\frac{\partial f}{\partial \varepsilon}\Big|_{\varepsilon=\mu} = \frac{\exp(0)}{(\exp(0)+1)^2}\frac{1}{\tau} = \boxed{\frac{1}{4}\frac{1}{\tau}}$$

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