

70. (Fourth problem of **Cluster**)

From Eq. 27-23, we obtain the resistance at temperature T :

$$R = \frac{V^2}{P} = \frac{12^2}{10} = 14.4 \, \Omega .$$

Thus, the ratio R/R_0 with R_0 representing the resistance at 300 K is 7.2, which we take to equal the ratio of resistivities (ignoring any thermal expansion of the filament). Eq. 27-17, then, leads to

$$\frac{\rho}{\rho_0} = 7.2 = 1 + \alpha (T - 300) \quad .$$

Using Table 27-1 ($\alpha = 4.5 \times 10^{-3}/\text{K}$) we find $T = 1.7 \times 10^3 \, \text{K}$.