69. We denote $T_H = 100°\text{C}$, $T_C = 0°\text{C}$, the temperature of the copper-aluminum junction by T_1 and that of the aluminum-brass junction by T_2. Then,

$$P_{\text{cond}} = \frac{k_c A}{L}(T_H - T_1) = \frac{k_a A}{L}(T_1 - T_2) = \frac{k_b A}{L}(T_2 - T_c) \ .$$

We solve for T_1 and T_2 to obtain

$$\begin{aligned} T_1 &= T_H + \frac{T_C - T_H}{1 + k_c(k_a + k_b)/k_a k_b} \\ &= 100°\text{C} + \frac{0.00°\text{C} - 100°\text{C}}{1 + 401(235 + 109)/[(235)(109)]} = 84.3°\text{C} \end{aligned}$$

and

$$\begin{aligned} T_2 &= T_c + \frac{T_H - T_C}{1 + k_b(k_c + k_a)/k_c k_a} \\ &= 0.00°\text{C} + \frac{100°\text{C} - 0.00°\text{C}}{1 + 109(235 + 401)/[(235)(401)]} \\ &= 57.6°\text{C} \ . \end{aligned}$$