

$$r=a$$

$$-kA \frac{dT}{dr} \Big|_{r=a} = 0 \rightarrow \frac{dT}{dr} \Big|_{r=a} = 0$$

Sub:

$$0 = -\frac{q_0 a}{k_0} + C_1 \rightarrow \frac{q_0 a}{k_0}$$

$$\rightarrow \frac{dT}{dr} = -\frac{q_0 r}{k_0} + \frac{q_0 a}{k_0}$$

$$\rightarrow \frac{dT}{dr} = (a-r) \frac{q_0}{k_0}$$

Part (b)

$$\text{units} \rightarrow \frac{q_0 \text{ W/m}^3}{k_0 \text{ W/m}\cdot\text{K}} \rightarrow \frac{\text{K}}{\text{m}^2}$$

$$(a-r)\text{m} \rightarrow \text{m}$$

$$\frac{q_0}{k_0}(a-r) = \frac{\text{K}}{\text{m}^2} \cdot \text{m} \rightarrow \text{K/m}$$

Integrate find $T(r)$:

$$T(r) = \int \left(-\frac{q_0}{k_0} r + \frac{q_0 a}{k_0} \right) dr \rightarrow T(r) = -\frac{q_0}{2k_0} r^2 + \frac{q_0 a}{k_0} r + C_2$$

$$r=b$$

$$-k(b) \frac{dT}{dr} \Big|_{r=b} = h(T(b) - T_\infty) \leftarrow \frac{dT}{dr} \Big|_{r=b} = \frac{q_0}{k_0}(a-b)$$

$$-k(b) \frac{q_0}{k_0}(a-b) = h(T(b) - T_\infty) \leftarrow k(b) = k_0$$

$$-q_0(a-b) = h(T(b) - T_\infty) \rightarrow -q_0(a-b) = h(T(b) - T_\infty)$$

$$T(b) = T_\infty + \frac{q_0(b-a)}{h}$$

$$\left. \begin{array}{l} T(b) = T(b) \\ \text{solve for } T \end{array} \right\} \leftarrow r=b$$

$$T(b) = -\frac{q_0 b^2}{2k_0} + \frac{q_0 a b}{k_0} + C_2$$

$$T_\infty + \frac{q_0(b-a)}{h} = -\frac{q_0 b^2}{2k_0} + \frac{q_0 a b}{k_0} + C_2$$

$$C_2 = T_\infty + \frac{q_0(b-a)}{h} + \frac{q_0 b^2}{2k_0} - \frac{q_0 a b}{k_0}$$