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1. This assumes 1-D in x, (constant y, z) steady state and constant thermal conductivity

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$$\frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right) + Q = 0$$

$$k\frac{\partial T}{\partial x} = -Qx + C_1$$

using $\partial T/\partial x\,(x_0) = \partial T/\partial x\,(0) = 0$

$$0 = C_1$$

$$\Rightarrow \frac{\partial T}{\partial x} = -\frac{Qx}{k}$$

$$T = \frac{Qx^2}{k} + C_2$$

using $T(x_1) = T_1$ and $x_1 = X$

$$T(X) = T_1 = -\frac{QX}{k} + C_2$$

$$\Rightarrow C_2 = T_1 + \frac{QX}{k}$$

$$\Rightarrow T(x) =$$

- dropped the $x^2 \neq X^2$

$$\frac{Q(X - x)}{k} + T_1$$

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