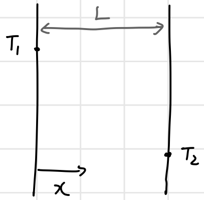

What is $T(x)$?

$$\frac{d^2T}{dx^2} = 0 \longrightarrow \frac{dT}{dx} = C_1 \longrightarrow T(x) = C_1 x + C_2$$

Apply boundary conditions:

$@\, x = 0,\ T = T_1 \quad \therefore C_2 = T_1$

$@\, x = L,\ T = T_2 \quad \therefore T_2 = C_1 L + T_1 \longrightarrow C_1 = \dfrac{T_2 - T_1}{L}$

$$\therefore T(x) = \left(\frac{T_2 - T_1}{L}\right)x + T_1$$ ← Now we have T everywhere in the wall

$$\frac{dT}{dx} = \frac{T_2 - T_1}{L}$$

$$\dot{Q}'' = -k\frac{dT}{dx} = -k\left(\frac{T_2 - T_1}{L}\right)$$

$$\dot{Q} = -kA\left(\frac{T_2 - T_1}{L}\right)$$

- This analysis yields "local" values — can find temp. everywhere in wall
- We can use different boundary conditions for different scenarios
  - ↳ ex: $\dfrac{dT}{dx}$ = fixed