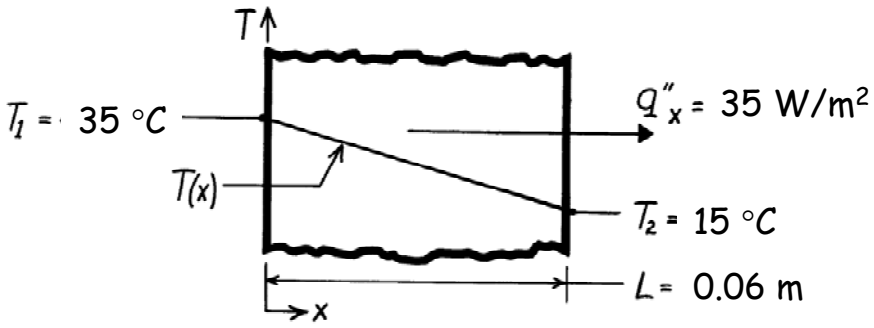
PROBLEM 1.6

KNOWN: Heat flux and surface temperatures associated with a wood slab of prescribed thickness.

FIND: Thermal conductivity, k, of the wood.

SCHEMATIC:



ASSUMPTIONS: (1) One-dimensional conduction in the x-direction, (2) Steady-state conditions, (3) Constant properties.

ANALYSIS: Subject to the foregoing assumptions, the thermal conductivity may be determined from Fourier's law, Eq. 1.2. Rearranging,

$$k = q''_x \frac{L}{T_1 - T_2} = 35 \frac{W}{m^2} \frac{0.06m}{(35\text{-}15)^\circ C}$$

$$k = 0.11 \text{ W/m·K} \quad <$$

COMMENTS: Note that the °C or K temperature units may be used interchangeably when evaluating a temperature difference.