A short summary about the conductive heat transfer：

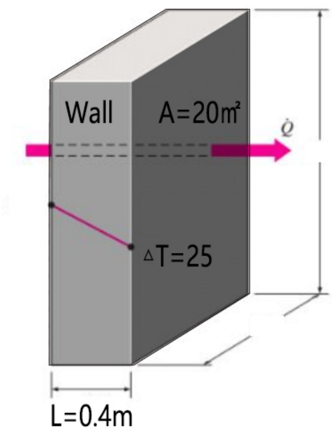
- Heat transfer can occur either by conduction, convection or radiation.

- Heat transfer through the wall of a house can be modeled as steady and one-dimensional.

- The temperature of the wall in this case depends on one direction only(say the x-direction) and can be expressed as T(x).

- The rate of heat conduction through a plane wall:
  ① Is proportional to the average thermal conductivity, the wall area, and the temperature difference. ↑
  ② But is inversely proportional to the wall thickness. (For example, the thicker the wall, the less heat goes through it.) ↓
  ③ Once the rate of heat conduction is available, the temperature T(x) at any location x can be determined by replacing T_2 by T, and L by x
  ④ Under steady conditions, the temperature distribution in a plane wall is a straight line: dT/dx=const

Exercise: find the rate of heat transfer
with L= 0.4 m, A= 20 m^2, △T= 25, and k=0.78 W/m K
using both simple method and using the resistance concept.



Simple method

$$\dot{Q}=kA\frac{\triangle T}{L}=0.78\frac{W}{mK}*20m^2*\frac{25K}{0.4m}=975W$$

Using the resistance concept

$$R_{wall}=\frac{L}{kA}=\frac{0.4m}{\frac{0.78W}{mK}*20m^2}\approx 0.0256K/W$$

$$\dot{Q}=\frac{\triangle T}{R_{wall}}=\frac{25K}{0.0256K/W}\approx 976.6W$$