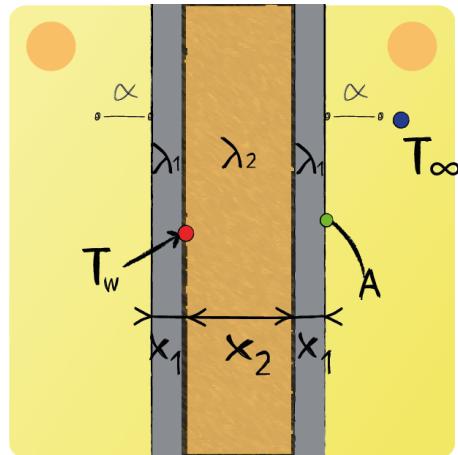


Lecture 7 Question 2

A multi-layer wall is constructed of fiberglass insulation sandwiched between two layers sheet metal. Assume steady-state, one-dimensional heat transfer.

Give an expression for the rate of heat transfer \dot{Q}



Rate of heat transfer through a multi-layer wall with convection:

$$\dot{Q} = \frac{T_A - T_B}{\frac{1}{\alpha_A} + \sum_{i=1}^n \frac{\delta_i}{\lambda_i} + \frac{1}{\alpha_B}}$$

Between T_w and T_∞ we have 2 solid layers and convection is taking place at the right-side.

And thus:

$$\dot{Q} = \frac{T_w - T_\infty}{\frac{x_2}{\lambda_2 \cdot A} + \frac{x_1}{\lambda_1 \cdot A} + \frac{1}{\alpha \cdot A}}$$