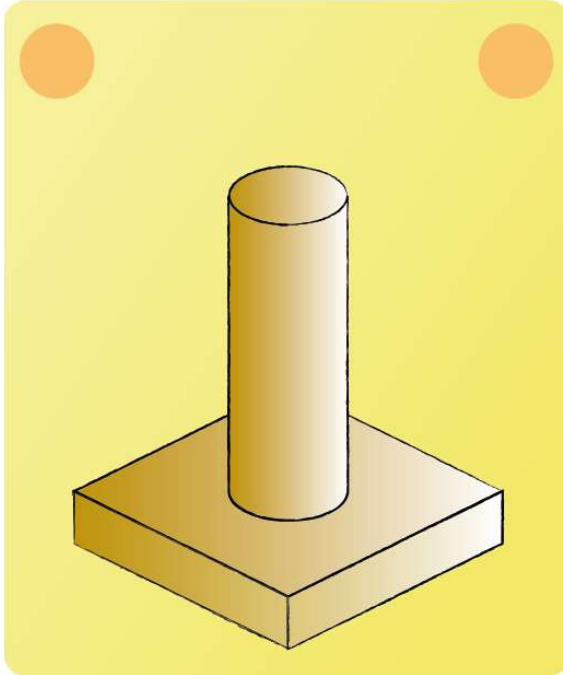


## Lecture 11 - Question 2



Remember the inhomogeneous differential equation for fins:

$$\lambda \cdot A_c \cdot \frac{\partial^2 T}{\partial x^2} = \alpha \cdot U (T(x) - T_A)$$

Which of the following terms can be used to simplify it to a 2nd order homogeneous differential equation?

$$\theta(x) = T(x) - T_A$$

Substitution of:  $\theta(x) = T(x) - T_A$  and thus  $\frac{\partial^2 \theta}{\partial x^2} = \frac{\partial^2 T}{\partial x^2}$  into  $\lambda \cdot A_c \cdot \frac{\partial^2 T}{\partial x^2} = \alpha \cdot U (T(x) - T_A)$  leads to:

$$\lambda \cdot A_c \cdot \frac{\partial^2 \theta}{\partial x^2} = \alpha \cdot U \cdot \theta(x)$$



Rearranging results in the 2nd order homogeneous differential equation:

$$\frac{\partial^2 \theta}{\partial x^2} - \frac{\alpha \cdot U}{\lambda \cdot A_c} \cdot \theta(x) = 0$$