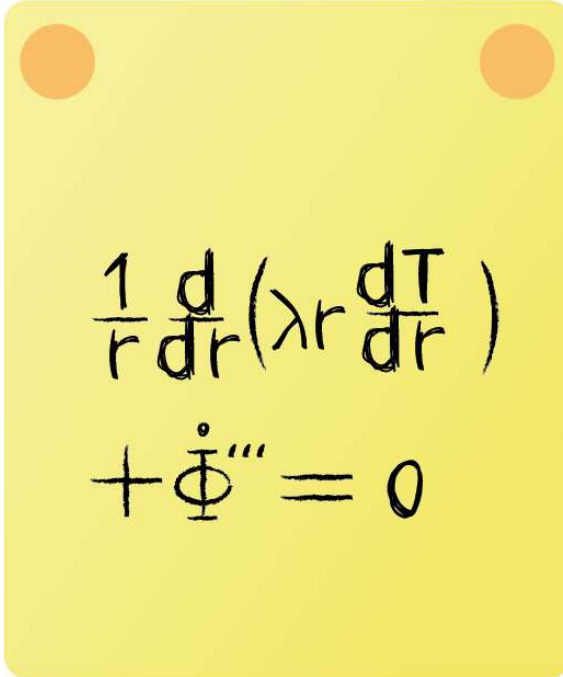


## Lecture 13 - Question 1



$$\frac{1}{r} \frac{d}{dr} \left( \lambda r \frac{dT}{dr} \right) + \dot{\Phi}''' = 0$$

Consider a medium in which the heat conduction equation is given in its simplest form as:

$$\frac{1}{r} \frac{d}{dr} \left( \lambda r \frac{dT}{dr} \right) + \dot{\Phi}''' = 0$$

Indicate whether:

The heat transfer is **steady** / **transient**

The heat transfer is **one-** / **two-** / **three-dimensional**.

There is **heat generation** / **no heat generation** in the medium.



From the equation it can be seen that the heat transfer is **steady**, as  $\frac{\partial}{\partial t} = 0$ .

The heat transfer is **one-dimensional** as  $\frac{\partial}{\partial r} = \frac{d}{dr} \neq 0$ .  $\dot{\Phi}'''$  represents a volume-based heat source. Implying that **heat generation** takes place.