Module 2: Short questions

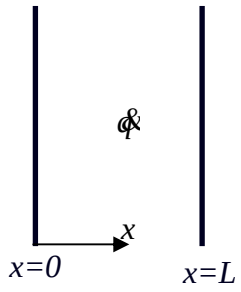
1. How does transient heat transfer differ from steady state heat transfer?

2. What is meant by the term “one-dimensional” in the context of conduction heat transfer?

3. What is meant by thermal resistance? Under what assumptions can the concept of thermal resistance be applied in a straightforward manner?

4. For heat transfer through a single cylindrical shell with convection on the outside, there is a value for the shell radius for a nonzero shell thickness at which the heat flux is maximized. This value is
   (A) k/h
   (B) h/k
   (C) h/r
   (D) r/h

5. The steady temperature profile in a one-dimensional heat transfer across a plane slab of thickness L and with uniform heat generation, $\dot{q}$, has one maximum. If the slab is cooled by convection at $x = 0$ and insulated at $x = L$, the maximum occurs at a value of x given by



   (A) 0
   (B) $\frac{L}{2}$
   (C) $\frac{\dot{q}}{k}$
   (D) L

6. Consider a cold canned (typically cylindrical in shape) drink left on a table. Would the heat transfer be steady or transient? Would you model the heat transfer as one-, two-, or three-dimensional? Also, which coordinate system would you use to analyse this heat transfer problem?