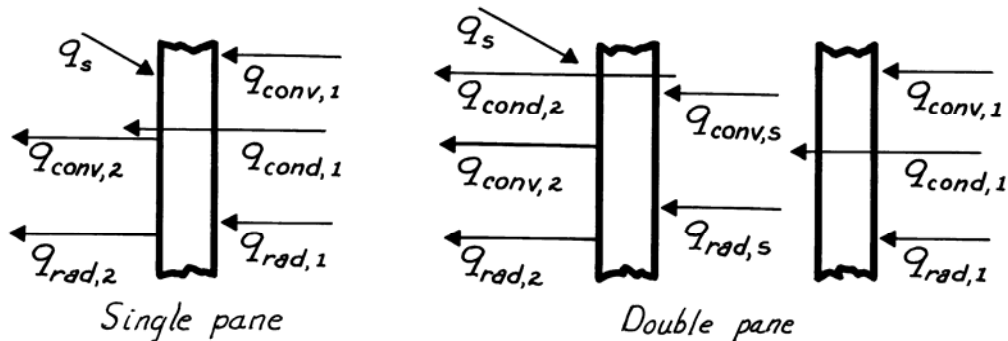# PROBLEM 1.87(a)

KNOWN: Room air is separated from ambient air by one or two glass panes.

FIND: Relevant heat transfer processes.

SCHEMATIC:

The relevant processes associated with single (above left schematic) and double (above right schematic) glass panes include.

$q_{conv,1}$ Convection from room air to inner surface of first pane,

$q_{rad,1}$ Net radiation exchange between room walls and inner surface of first pane,

$q_{cond,1}$ Conduction through first pane,

$q_{conv,s}$ Convection across airspace between panes,

$q_{rad,s}$ Net radiation exchange between outer surface of first pane and inner surface of second pane (across airspace),

$q_{cond,2}$ Conduction through a second pane,

$q_{conv,2}$ Convection from outer surface of single (or second) pane to ambient air,

$q_{rad,2}$ Net radiation exchange between outer surface of single (or second) pane and surroundings such as the ground, and

q_S Incident solar radiation during day; fraction transmitted to room is smaller for double pane.

COMMENTS: Heat loss from the room is significantly reduced by the double pane construction.