Math 301-132 Quiz 6

Q.1: Find the steady-state temperature in the circular cylinder of radius 2 and height 4 by solving
\[
\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial z^2} = 0,
\]
with \(u(r, 0) = 0\), \(u(r, 4) = 5\) and the lateral side is insulated.
Q.2: Solve \( \frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} = \frac{\partial^2 u}{\partial t^2} \) to find the displacement \( u(r, t) \) in a circular membrane of radius 4 clamped along its circumference if its initial displacement is 0 and it has initial unit velocity in upward direction.