1- In a food processing facility, a spherical container of inner radius \( r_1 = 40 \text{cm} \), outer radius \( r_2 = 41 \text{cm} \), and thermal conductivity \( k = 1.5 \text{W/m.K} \) is used to store hot water and to keep it at 100°C at all times. To accomplish this, the outer surface of the container is wrapped with a 500-W electric strip heater and then insulated. The temperature of the inner surface of the container is observed to be nearly 100°C at all times. Assuming 10 percent of the heat generated in the heater is lost through the insulation, (a) express the differential equation and the boundary conditions for steady one-dimensional heat conduction through the container, (b) obtain a relation for the variation of temperature in the container material by solving the differential equation, and (c) evaluate the outer surface temperature of the container.