

Student Name:

Student Number:

- 1- Consider a very long rectangular fin attached to a flat surface such that the temperature at the end of the fin is essentially that of the surrounding air, i.e. 20°C . Its width is 5.0 cm; thickness is 1.0 mm; thermal conductivity is $200\text{ W/m}\cdot^{\circ}\text{K}$; and base temperature is 40°C . The heat transfer coefficient is $20\text{ W/m}^2\cdot^{\circ}\text{K}$. Estimate the fin temperature at a distance of 5.0 cm from the base and the rate of heat loss from the entire fin. **(40 Score)**

2- In a meat processing plant, 2-cm-thick steaks ($k = 0.45 \text{ W/m} \cdot ^\circ\text{C}$ and $\alpha = 0.91 \times 10^{-7} \text{ m}^2/\text{s}$) that are initially at 25°C are to be cooled by passing them through a refrigeration room at -11°C . The heat transfer coefficient on both sides of the steaks is $9 \text{ W/m}^2 \cdot ^\circ\text{C}$. If both surfaces of the steaks are to be cooled to 2°C , determine how long the steaks should be kept in the refrigeration room. What are the required assumptions for your solution?
(60 Score)