CHG 2314
HEAT TRANSFER

Professor: **B. Kruczek** **2005/02/04**

Assignment No. 4

1. Problem 3.73 (a). Do not answer parts (b) and (c).

2. Problem 3.92 and the following additional questions. What should be the outer diameter of the sleeve to minimize the temperature at the center of the rod assuming,

   c) The convection heat transfer coefficient is independent of the outer diameter of the sleeve.
   d) The convection heat transfer coefficient depends on the outer diameter of the sleeve,

   $$h = 15.81 D^{-0.5}$$

   where D is the outer diameter of the sleeve in [m].

3. A pin fin A of length L_A = 50 mm and the diameter D_A = 5 mm is attached to a hot surface at T_b = 100°C. The hot surface and the fin are in the environment at T_∞ = 20°C and the corresponding outside heat transfer coefficient h = 30 W/m^2 K. The thermal conductivity of the fin A k_A = 35 W/m K. A pin fin B of the diameter D_B = 4 mm having the thermal conductivity k_B = 80 W/m K is attached to the same hot surface and is exposed to the same environment as fin A. What should be the length of B for the rate of heat transfer from both fins be the same assuming,

   a) Negligible rate of heat transfer from the tip (i.e., insulated tip).
   b) Convective heat transfer from both tips (h = 30 W/m^2 K).
   c) The tips of both fins maintained at 80°C.

Due Date: **Feb. 11, 2005 at 4:00 p.m. in the assignment box.**