Indian Institute of Technology, Kharagpur
Mechanical Engineering Department

Heat Transfer – Autumn 2016
Homework Assignment - 1

This is a group assignment. Follow the grouping decided in class.

The figure below shows the cross section of a long bar. Three sides are maintained at the same temperature, T_o, while the remaining side is at a different temperature T_a. You have to determine the steady state temperature distribution inside the cross section numerically and analytically. You can *choose your own values* for T_o, T_a, L and W.

a) The analytical solution for a similar problem has been derived in class. Keep adding the terms of the infinite series and decide when you want to truncate the series. Give reasons for your decision.

b) Solve the governing equation numerically following the procedure taught in class. Do a mesh sensitivity study and show how your results vary with mesh refinement.

c) Compare the analytical and numerical solutions for the temperature at the center point and the temperature profile in y- direction at $x = L/2$.