



Heat transfer II
Homework set 5

Course by Dr.Moosavi
Due date: 90/9/6

- 1- Air at 0.0004 Kg/s and 27 C enters a triangular duct that is 20mm on a side and 2 m long. The duct surface is maintained at 100 C. Assuming fully developed flow throughout the duct, determine the air outlet temperature.

- 2- Water at a flow rate of $\dot{m}/dt = 0.215$ Kg/s is cooled from 70 C to 30 C by passing it through a thin-walled tube of diameter $D = 50$ mm and maintaining a coolant at $T^\infty = 15$ C in cross flow over the tube.
 - a) What is the required tube length if the coolant is air and its velocity is $V = 20$ m/s?
 - b) What is the tube length if the coolant is water and $V = 2$ m/s ?

- 3- A thick-walled, stainless steel (AISI 316) pipe of inside and outside diameters $D_i = 20$ mm and $D_o = 40$ mm is heated electrically to provide a uniform heat generation rate of $dq/dt = 10^6$ W/m³. The outer surface of the pipe is insulated, while water flows through the pipe at a rate of $\dot{m}/dt = 0.1$ Kg/s.