EMBRY-RIDDLE AERONAUTICAL UNIVERSITY
Engineering Science

ES 312 – Fund. Of Energy Transfer
Homework Assignment 3
Due: 2/22/08

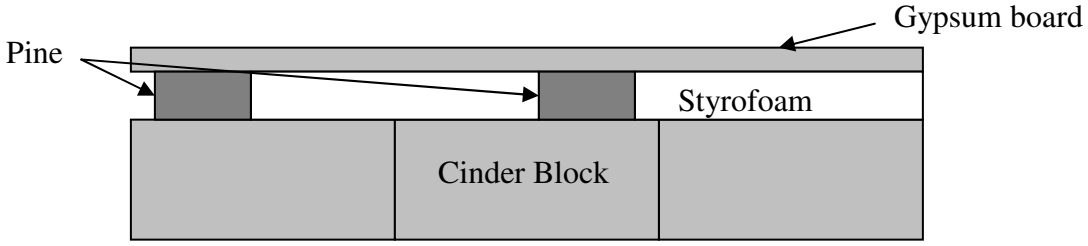
Problems from Holman:

Chapter 1: 1-21, 1-24, 1-27

Chapter 2: 2-6, 2-19, 2-26

Additional problems:

2) A basement wall is constructed of 20 cm of cinder (concrete) block, 5 cm of styrofoam insulation (k=0.033 W/m K), and 2 cm of gypsum board (plaster). To support the wall board, there are 5 cm wide strips of yellow pine every 60 cm between the sheets of Styrofoam. Calculate the overall heat transfer coefficient (U) for this wall.



4) A 1.0 mm diameter wire is maintained at a temperature of 400^{o}C and exposed to a convection environment at 40^{o}C with h=120 W/m^{2} K. Calculate the thermal conductivity which will just cause an insulation thickness of 0.2 mm to produce a "critical radius." How much of this insulation must be added to reduce the heat transfer by 75 percent from that which would be experienced by the bare wire?