

BAE 103
Energy in Biological Systems

Problem Set No. 15
Heat Transfer Through Walls
Due Date: Wednesday, April 11

- 15.1 Estimate the heat loss from a ranch residence (28 feet wide, 65 feet long by 8 feet high) with walls constructed as follows: 1/2" x 8" lapped siding, 25/32" insulation board, 2 inches mineral wool insulation, 3/4 inch air space, 1/2 inch gypsum board. It has double glazed windows with an R-value of 2.00 Btu/hr/ft²/°F. The total window area is 180 ft². It has three outside doors totaling 60 ft². Assume the heat loss rate through the doors per ft² will be same as through the windows. The roof is pitched with the ceiling constructed of 1/2 inch gypsum board and 6 inches of glass loose fill insulation. The floor is constructed of 3/4 inch oak over 1/2 inch plywood with 3 inches of glass wool insulation underneath. The house is constructed over a ventilated crawl space. Assume the inside temperature is to be kept at 70°F and the outside temperature is 20°F.