

BAE 103
Energy in Biological Systems

Quiz 6
Concepts: Heat Transfer

Name: _____

- 6.1 A new building material has been developed for resisting heat transfer by conduction. In laboratory tests, the material was found to conduct heat at a rate of 10.2 Btu's per hour per square feet of surface area. The temperature on the cold side of the wall was held at a constant 11°C. The test specimen is 15.0 cm thick. Assume the resistivity of this material is 0.023 m²°C/W·m. What is the temperature (C) of the warm side of the wall?
- 6.2 Heat loss through the walls of a residential structure is estimated to be 7.8 Btu's per hour per square foot. The temperature differential between indoors and outdoors is 50°F. How long (days) will it take the homeowner to recover the \$0.75 per square foot cost of adding loose fill fiberglass insulation to the wall cavity at the 50°F temperature differential. The additional insulation has an R-value of 12.2 hft²°F/Btu. A heat pump with a COP of 2.3 is used to heat the home, and electricity costs \$0.075 per kW·h.