

**BAE 103**  
**Energy in Biological Systems**

**Problem Set No. 16**  
**Concepts: Economics of Insulation**  
**Due Date: Wednesday, April 18**

- 16.1 Develop an Excel spreadsheet that plots the return period for investing in the addition of insulation to the attic of a home. Assume the indoor temperature is held at 70°F, and that the average outdoor temperature for the five-month heating season is 35°F. The ceiling of the home is constructed of 0.5 in. thick drywall with  $t_{initial}$  inches of the fiberglass loose-fill insulation. Up to 12 in. of additional loose-fill insulation is to be added. The cost per inch of additional insulation is  $s_{insulation}$  (\$/in/ft<sup>2</sup>). The energy cost for heating the home is  $s_{heating}$  (\$/10<sup>6</sup> Btu's). You should plot the payback period (years) versus the depth of insulation to be added to the attic. Use labels to identify all of the pertinent variables. Shade the cells intended for user input. Your spreadsheet should be submitted electronically as an attachment to e-mail. Send these attachments to [shearer@bae.uky.edu](mailto:shearer@bae.uky.edu). The title of the Excel file must contain your last name.