Solar and Cooling Load Homework Due Thursday, October 27

1. Consider the position of the sun in the sky at 11:00 a.m. MDT (Mountain Daylight Time) on October 21 in Boulder, CO, with latitude of 40°N and longitude of 105°W.
   a. What is the solar time when the clock time is 11:00 a.m. MDT?
   b. What is the solar altitude angle?
   c. What is the solar azimuth (or bearing) angle?

2. A south-facing window in a house in Boulder measures 6 ft wide by 4 ft high. It is desired to shade the window with an overhang.
   a. Using the guidelines from Chapter 6 in the text, what would be an appropriate distance for the overhang to project from the wall?
   b. Using simple trigonometry, calculate the projection of an overhang to exactly shade the entire window at solar noon (when the sun is at its highest point in the sky) on July 21. Assume the overhang projects from the wall at the top of the window.

3. A south-facing window in a house in Boulder measures 6 ft wide by 4 ft high. The window has a 1 ft. overhang on the outside and fully closed draperies on the inside. The window is double-glazed with clear glass. Consider the heat gain through the window and its impact on the design cooling load.
   a. What is the shade line factor (SLF) for the window?
   b. What is the glass load factor (GLF)?
   c. What is the cooling load contribution in Btu/hr?

4. Consider the cooling load contribution due to a west-facing wall in a house in Denver. The wall has an overall R-value of 16 hr ft²°F/Btu and a net area of 200 ft².
   a. What is the cooling load temperature difference (CLTD)?
   b. What is the cooling load contribution in Btu/hr?

5. Calculate the cooling load for the master bedroom in the Hayek residence, Figure 4.23 in the text. Do not include the bathroom. Assume the south windows are unshaded. State your assumptions.