Homework Assignment:

1. For this problem, you will be revisiting Exercises 2.1 and 2.2 from the notes. Add capacitances to each of your circuit models and use MATLAB to plot temperature (for each metal and boundary) and heat transfer for each boundary as a function of time. Assume that the height for the wall in each exercise is 30 cm and the depth (into the page) is 50 cm and that the wall starts at the higher temperature. Answer the following questions:
   a. Approximately how long does it take for the wall to reach steady state?
   b. What are the steady-state temperatures? Do they agree with the expected values?

2. So far, we've been treating our forcing functions as a constants. However, the equivalent circuit method is extremely powerful because we are able to input any forcing function we want. For this problem, you are going to be revisiting HW 2 and inputting a time-varying forcing function.
   a. Make T_∞ a sine function with an amplitude of $A = 25\ °C$, an average value of $T_{av} = 25\ °C$, and a period of 2 minutes. (*Hint: what does a sine function look like in the LaPlace domain? How can you verify that you did this correctly?*)
   b. Plot the temperature at node T and the heat transfer of the system as a function of time.
   c. Once again, make R a vector and loop over the varying values with the new forcing function. How does varying R affect the behavior of the system?