

AME 20231
Homework 6
Due: Friday, 1 March 2013, in class

1. 5.79, take instead the heat treatment to be at 450°C .
2. 5.97
3. 5.114.
4. 5.169, let the surrounding temperature be 25°C .
5. You supervise an industrial process which uses forced convection to cool hot 10 g steel ball bearings. In the forced convection environment, the heat transfer coefficient is $h = 0.1\text{ kW/m}^2/\text{K}$. The initial temperature is 1500 K . The ambient temperature is 300 K . Using the method developed in class, estimate the time constant of cooling, find an expression for $T(t)$, and find the time when $T = 350\text{ K}$. Plot $T(t)$. Repeat the analysis for a 1 kg sphere.
6. 5.228; give a computer-generated plot of the temperature increase as a function of car mass, holding all other things constant; for your plot you may hold the initial and final velocities at 60 km/hr and 20 km/hr , respectively.