

AME 20231
Homework 6
Due: Friday, 2 March 2012, in class

1. 5.81
2. 5.95
3. 5.109
4. 5.171
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 $h = 0.2 \text{ kW/m}^2/\text{K}$. The initial temperature is 1600 *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.