AME 20231
Homework 6
Due: Tuesday, 23 March 2021, 9:00 AM, on Sakai

1. 3.94, take instead the final temperature to be 50°C.
2. 3.102, take instead the final temperature to be 600 K.
3. 3.119, take instead the polytropic exponent to be $n = 1.37$.
4. 3.157. Estmate the total financial cost of this over one year. Estimate the fraction of the US Gross Domestic Product this represents. Identify and cite sources for used for your estimates.
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 $\mathsf{h} = 0.1$ kW/m$^2$/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 $T = 350$ K. Plot $T(t)$. Repeat the analysis for a 1 kg sphere.