These problems are due on Friday, Sept 4.

1. A baseball has a mass of 0.3 lbm. What is the kinetic energy of a 94 mile/hr fastball, relative to the batter, in Btu? Note 1 Btu = 778 ft-lbf
2. A 2-kg object is accelerated from 200 m/s to 500 m/s by the action of a force, F.
   a) What is the change in energy and thus the amount of energy added to the object?
   b) Is this a work or heat interaction?
   c) If the acceleration happens over a distance of 10 m and the force is constant during this time, compute the magnitude of the force.
3. A gas is compressed from $\forall_1 = 0.3 \, m^3$ and $P_1 = 100 \, kPa$ to $\forall_1 = 0.1 \, m^3$ and $P_1 = 300 \, kPa$. During this process the pressure varies linearly with volume. Find the work done on the gas.
4. Air undergoes three processes in series:
   Process 1 – 2: compression with $P=const$ from $P_1=10 \, lbf/in^2$, $\forall_1 = 4 \, ft^3$ to state 2
   Process 2 – 3: constant volume heating to state 3 where $P_3= 50 \, lbf/in^2$
   Process 3 – 1: Expansion to the initial state during which $P\forall = const$
   a) sketch the cycle on $P\forall$ coordinates
   b) find the volume $\forall_2$
   c) compute the work for each process