Tips for HW12

1. You can get W\_dotout is from the current and voltage. Q\_dotin is given as 5.5W. A simple First Law analysis should get you all of the information you need to solve this problem.
2. First step: Calculate the change in internal energy (ΔU) in Btu that comes from the temp change.   
   Second step: Calculate the change in potential energy (ft\*lbf) from the falling mass.   
   Third step: Apply First Law to the system. Since Q is zero (insulated bucket) you should get  
   -W = ΔU. You have –W in units of ft\*lbf, and ΔU in units of Btu. This should allow you to find the unit conversion between them.
3. Three key relationships
   * Q – W = ΔU
   * W = ∫p dV,
   * ΔU = m ∫ cv dT
4. Two step process, so you will have State 1 (starting point), State 2 (when piston first hits the stop), and State 3 (ending point). Starts at sat liquid and expands until hits the volume stop. What kind of process goes between State 1 and State 2 (iso\_\_\_\_\_\_)? Once the piston hits the stop there is an increases in pressure (and temp) until hits sat vapor. What kind of process goes between State 2 and State 3 (iso\_\_\_\_\_\_)?   
   Apply First Law to each process Q – W = ΔU