

Physics 301

Homework due 28 August 2024

- 1) Consider a system of two objects. Let Object 1 be a baseball and Object 2 be a moving truck. Show algebraically that if you throw the baseball at a truck that is approaching you, the baseball recoils with more energy than it had before it struck. Show that if you throw the ball at a receding truck, it recoils with reduced energy. Relate your results to the effect of compression or expansion upon the energy of a gas particle.
- 2) Stowe problem 6.4.
- 3) Stowe problem 6.5.
- 4) Consider a gas of linear triatomic molecules in a field-free environment. Predict the fraction of the total internal energy that is associated with their vibration.
- 5) Describe a situation in which the internal energy of a system is simultaneously changed thermally, diffusively, and by work. Choose a case in which the work is not associated with a macroscopic object like a piston. Pick reasonable numerical values for all the parameters that contribute to the internal energy, and use the First Law to calculate the change in internal energy. Be clear about signs.