Assignment #9: due July 10

1. **Shocks**

(a) From the conservation laws given in the lecture

$$\rho_1 v_1 = \rho_2 v_2 \tag{1}$$

$$\rho_1 v_1^2 + P_1 = \rho_2 v_2^2 + P_2 \tag{2}$$

$$\rho_1 h_{tot1} v_1 = \rho_2 h_{tot2} v_2 \tag{3}$$

derive the jump condition across the shock in terms of the new density contrast ρ_1/ρ_2.

(b) How does this relate to the density contrast predicted from shocks in molecular clouds? What does this mean for the formation of dense structures in molecular clouds?

2. **Bonnor-Ebert spheres**

(a) Bonnor-Ebert spheres are hydrostatic solutions for spherical cores in pressure equilibrium with a confining medium. Describe the properties of such a core at small and large radii.

(b) In what ways might such a core become unstable?

(c) What are the limitations of treating real cores in molecular clouds as idealised Bonnor-Ebert spheres?