AST353 (Spring 2016) **ASTROPHYSICS Problem Set 4** Due in class: Thursday, April 7, 2016 (worth 10/100)

1. Viscosity in a Protostellar Accretion Disk

Starting from the basic equation for angular momentum transport (here written in scalar form):

$$\tau = \frac{dL}{dt} , \qquad (1)$$

fill in the details that we skimmed over in class to show that the viscosity in the accretion disk is

$$\nu_{\rm vis} = \lambda_{\rm mfp} c_s \simeq r v_r \ . \tag{2}$$

Here, all the symbols have the meaning that we introduced in class, but please feel free to ask Benny or me for clarification.

2. Formation of the First Stars

Carefully read Section 4.1 (Metal-free Stars) in the Loeb book.

Succinctly summarize the key physical argument for why theorists believe that the first (Population III) stars were typically much more massive than stars that form today in the Milky Way (Population I stars).