

AST 301
Homework #9
Due Friday Nov. 19

1. I observed gas clouds orbiting around the center of the Milky Way. A gas cloud in an orbit 1 pc (about 200,000 AU) from the center is moving with a speed of 120 km/s.
 - a) How does the circumference of that gas cloud's orbit compare to the circumference of the Earth's orbit around the Sun?
 - b) The Earth orbits the Sun with a speed of 30 km/s. How does the time it takes the gas cloud to go around its orbit compare to the time it takes the Earth to go around its orbit? What is the period of the gas cloud's orbit, in years?
 - c) Use Kepler's 3rd law to figure out what the mass is that the gas cloud is orbiting around. (If you have the radius of the orbit in AU, and the period in years, you will get the mass in solar masses, which is what I want.)
 - d) How does the mass inside of the gas cloud's orbit compare to the mass inside of a 1 pc radius circle around the Sun? (Hint: your book has a table of the stars closest to the Sun.)