Outline

• Exam will be drawn from material in Chapters 6 and 7.
• It may be useful to study these problems and the homework problems. Also read over the textbook and class notes for short answer questions.
• I might be unable to resist putting on a dimensional analysis problem.
Rotation curve

- The dark matter halo of the Milky Way has a density profile that depends on radius raised to some power $n$. Derive the value of $n$. Explain the key observational motivation and show the steps in your derivation.
Gravitational lensing

- The light curve below is of a star in the LMC from the MACHO experiment. Assuming the lens is in the halo of the Milky Way, estimate its mass.
Gravitational lensing

- Derive equation 6.44.
Cluster gas

- The luminosity per unit volume due to thermal bremsstrahlung of a hot plasma is
  \[ \varepsilon = 2.4 \times 10^{-27} T^{1/2} n_e^2 \text{ erg/s/cm}^3 \]
  where \( T \) is the temperature in K and
  \( n_e \) is the electron density in electrons/cm\(^3\).

- The Coma cluster has a radius of 1.5 Mpc, a temperature of about 8 keV, and an X-ray luminosity of \( 5 \times 10^{44} \) erg/s.
  Estimate the mass of the hot plasma in Coma.
• $^{147}\text{Sm}$ decays to $^{143}\text{Nd}$ with release of an alpha particle with a half-life of 106 Gyr.

• Estimate the age of the moon rocks in the plot below.