

# ASTR/PHYS 3070 Midterm 1 Study Guide

Comprehensive up through Chapter 6 (only the sections included in the reading)

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## Night Sky / Coordinates

- How does the night sky change based on your location on the Earth?
- What is the difference between the horizon and equatorial coordinate systems?
  - What terms define each system, and what do those terms refer to?
  - How does time factor in to the systems when using them to locate celestial objects?
- Why do stars rise at different times during the year?
- What causes the seasons?

## Kepler, Newton, and Orbits

- What are Kepler's 3 laws?
- How does the most general form of Kepler's 3rd law result in  $P^2 = a^3$ ?
- How does Newtonian gravity work?
- How does the energy of binary system determine the orbit of a planet?
- How does its strength depend on the separation of massive bodies?
- What is escape velocity?
- How do you design a Hohmann transfer orbit?

## Light

- What are the different wavelength regimes (radio, X-ray, etc.) of the electromagnetic spectrum?
- What is the difference between a blackbody spectrum, emission lines, and absorption lines? How are they produced?
- How are these spectral features produced (i.e., Kirchoff's laws)
- How do you calculate the wavelength of an absorption or emission line?
- What are the atomic processes that produce lines?
- What is the Doppler shift? How does it cause light to get redshifted and blueshifted?
- What are the different line broadening mechanisms?

## Telescopes and Making Measurements

- What are the fundamental attributes of a telescope?
- What is the plate scale?
- What determines the angular resolution of a telescope?
- How do imaging and spectroscopic telescope and detector systems differ?
  - Roughly, how does a CCD work?
  - How are color images obtained?
- How do you determine the uncertainty (i.e., error bar) of a counts measurement?
  - How do you convert that to a measurement of flux?
  - How do you convert flux to luminosity?
- Why are telescopes often placed on mountains?
- For what reasons would you opt to put a telescope in orbit, given the (much) additional expense, instead of on the surface of the Earth?