Review Topics for Exam #1
ASTR 250

Exam: Wednesday (March 4) during class

Your Professor and Graduate Teaching Assistant are anxious to help you during office hours, study sessions, the scheduled review session, and by appointment.

You may bring:
> open book & notes
> a calculator, but most problems will only use round numbers or powers of ten
> a <u>handwritten</u>, double-sided "crib sheet" of notes on a single, letter-sized page

Exam format:
> a series of related questions about a particular astronomical object
>> you will <u>choose</u> as many questions as you can – there will be too many to finish
> use scientific notation throughout
> must show logical details of your work, including "units"
> solutions must be readable
> explanations must use sentences

Suggested Study Methods:
> review and practice all our previous assignments and in-class problems
>
> understand and practice concepts; don't memorize details.
> for example, do you really understand the meaning of "equilibrium temperature"?
>
> review:
>> lecture notes
>> homework problems
>> interactive questions used during class
>
> test your understanding by:
>> posing variations of the homework problems: "What If?"
>
> understand:
>> how equations are derived
>> understand what assumptions (and units) the equations are based on
>
> have a "sense of scale" (Are my answers physically reasonable?)

Arithmetic concepts
> UNITS
> scaling relations (aka, proportionalities)
> convert between words, fractions, percentages, ratios, powers of ten, ppm
> scientific notation

metric system units including prefixes like kilo, milli, giga, micro, nano, etc.
angles (deg, arcmin, arcsec; radians)
small-angle equation
log-scales

Understand these terms, concepts, and related equations:
radius, diameter, circumference, surface area
albedo
angular diameter
blackbody
distances: AU, parsec, light-year
mass, density, volume

Kepler's Laws (various forms)
binary stars, center-of-mass, inclination angle
parallax

celestial coordinates:
      celestial sphere, celestial north & south poles, celestial equator
      AZ/EL and RA/DEC
      horizon, zenith, meridian, sidereal time, hour angle
      ecliptic, zodiac
      air mass, zenith distance

electromagnetic radiation:
      wavelength, frequency ($c=\lambda f$), bandwidth
      energy, flux, luminosity
      magnitudes: Apparent and absolute (various forms)
      blackbodies: Wien's Law, Stefan-Boltzmann Law
      color-index
      inverse-square law
      spectrum
      Doppler Shift ($\Delta\lambda/\lambda = v/c$), "radial velocity" - redshift, blueshift

exoplanets and circumstellar dust ("debris disk"):
      discovery techniques (astrometry, radial velocity, transit, direct imaging)
      equilibrium temperature
      "infrared excess"
      transit lightcurve

gravity:
      Newton's Law, tides, Hill sphere

orbits:
      eccentricity, semi-major axis, period
      speeds (circular & escape), vis-viva equation

physics:
    force, mass, acceleration
    energy: Potential and kinetic
    virial theorem

stars:
    spectral and luminosity types
    H-R Diagram

telescopes:
    resolution ("seeing," "Airy disk")