March 4th, 2004 **Astronomy 100** Dr. Warner

Review for the 2nd midterm exam

DISCLAIMER: THESE NOTES SHOULD HELP FOR THE PREPARATION OF THE SECOND MIDTERM EXAM. THEY INDICATE HOW TO DISTINGUISH THE ESSENTIAL FROM THE LESS ESSENTIAL MATERIAL. HOWEVER, THEY ARE NOT MEANT TO BE A COMPLETE LIST OF THE ESSENTIAL MATERIAL. **CAVEAT EMPTOR.**

As part of your review you should also refer to the other two handouts on planets: This handout is intended to both overlap and supplement the earlier handouts on planets.

Material appropriate to midterm 1 will not be specifically examined on midterm 2, **with the exception** of earlier material that is relevant, or built upon in the chapters that we have studied since midterm 1.

Chapter 4: Section 4.8 was not covered previously, and was an important part of our discussion of tides. Also the remarks on p.84 about the discovery of Uranus and Neptune.

Chapter 5: The more elementary parts of 5.1 and 5.2 were covered by midterm 1, and so the focus will now be remaining sections of chapter 5. However, a good understanding of the early parts of chapter 5 is essential to the rest of the exam and therefore you should go over this material again :

What waves are, and the meaning of frequency, period and wavelength - and how they are related to wave speed. Diffraction and interference, and the effects of wavelength and aperture size on diffraction. The nature of electromagnetic waves: the spectrum, light as a wave. You should know the names of the various kinds of electromagnetic radiation, and be able to order them according to wavelength, and you should know the approximate wavelength of visible light.

New material: Temperature and radiation: dominant wavelength (Wien's law), temperature dependence of energy flux (Stefan-Boltzmann). Moving sources, moving observers and the Doppler effect. Light as a particle: photons, energy of a photon, wave packets. Emission and absorption spectra, Kirchhoff's laws. Modern atomic theory, energy levels and spectral lines. There were also some topics like the photoelectric effect and wave-packets that were covered in lectures in more detail than is in the book.

Chapter 6:

Telescopes: refractors and reflectors - you should know the basic principles of each, as well as the advantages and disadvantages. You should know some of the basic terminology, and what it means: focus, focal length, resolving power (angular resolution), light-gathering, chromatic aberration . The importance of large objective diameter. Diffraction and its consequences for image quality. Other influences on image quality, like the atmosphere, light pollution, adaptive optics. Radio astronomy and radio telescopes, their advantages, limitations and modern improvements, particularly the use of shorter wavelengths and VLBI. Observations using various parts of the electromagnetic spectrum, and the role of the Earth's atmosphere in this.

Planets and Other Things in the Solar System

The Earth and Moon: The interior; plate tectonics; the atmosphere. The Moon: surface craters and maria; tides; synchronous rotation. You should also appreciate the Earth as a planet, and consider it in terms of the **handouts on planets.**

Continued over …..

Other planets: **See the handouts on planets**

You should, of course know the basic layout of the solar system, and the two fundamental classes of planets. I do not expect you to memorize the detailed data ... but you should have a rough idea of relative sizes, masses, distances and perhaps temperatures.

Major themes: planetary atmospheres, heating and cooling of planets and tidal phenomena. You should know about heat retention and generation as well as the mechanisms and side effects of planetary cooling. You should also have a general understanding of how different planetary atmospheres evolved, and the major steps in that evolution. You should know how tidal phenomena cause orbital resonance, synchronicity, planetary rings, ocean tides .... . You should have some idea about the various ways in which a planet can acquire a moon and why rings form. You should also know how the solar system formed and how it evolved into what we see today (**read sections 7.7 - 7.8**). The discovery of Uranus, Neptune and Pluto (p . 84 and sections 16.1 and 16.9) of the discovery of extra-solar planets (section 7.9).

The following is a (probably incomplete) list of some of the interesting phenomena that I covered:

- Chemical differentiation
- Plate tectonics
- Volcanism
- Earthquakes
- Tidal effects
- Greenhouse effect in general and on Venus, Earth, Mars
- Seasons/polar caps on Mars
- Synchronous rotation of various moons, and of Mercury
- Origins of large gaps in rings
- Magnetic fields of planets and liquid, electrically conducting cores
- Cratering on the surface of terrestrial planets
- **+ others**