AST 301--Scalo
Review sheet for Exam 1

The first exam will cover chapters 1 through 3 (except that we will postpone the section in ch.3 on the Doppler effect to exam 2). The material to be emphasized or omitted should by now be clear, both through the content of the lectures, and through the sheet "Guide to Reading and Study", which comments on each chapter and lists which end-of-chapter questions to try and which web-site self-test multiple choice questions you should try. This was sent out by class email and is available at the course web site (as is this review sheet). The main topics we have omitted are the phenomena of the night sky and the history of astronomy. Lists of terms with which you should be familiar are provided by the bold-faced words in each chapter summary (with the obvious proviso that you don't have to understand a word if we didn't cover the topic related to it). **Suggestion: see whether you can explain most of these terms in everyday language, and note whether you are repeating something you memorized or are explaining something you understand. Try to explain everything in everyday language.** After you have studied, be sure to try the interactive multiple choice questions at the text web site and the questions at the end of each chapter.

Besides Kepler's and Newton's laws, I think the most important and far-reaching thing to become familiar with are the names and order (in wavelength, frequency, and energy) of the different kinds of radiation--radio waves to gamma rays. Figures 3.4 and especially 3.9 provide a convenient visual aid for this. You should also be familiar with how the total amount of light, and the relative amounts of light emitted at different wavelengths are related to the temperature of an object, through the "radiation laws". Later we will use these to estimate properties of stars and galaxies that will give us clues to their evolution.

The lectures and reading guide sheet should also have made it clear that very little math will be used on the exam, and the few questions that do use math will be simple. Here's an example: If the earth were twice as far from the sun as it is now, how long would a year be? (You wouldn't have to give the numerical value of the answer; the correct choice might read "The cube root of ____", where I'll give you the pleasure of filling in that blank.) I just want to see if you understand that this is the kind of question that Kepler's third law allows you to answer, and that you know how to approach it. Another example: If the earth were three times as far from the sun as it is now, how much weaker would the gravitational force from the sun be? This one should seem simple if you understand all the "laws" we have covered. There might be about four questions that use numbers like this on the exam.

There are only a very few specific numbers that you should know, like the fact that the nearest star is a few light years (or about a parsec) away, which is a much greater distance than the size of the solar system (about 40 AU out to Pluto), and which is a tiny distance compared to the size of our galaxy (about 100,000 light years across—how many parsecs?). I will always tell you in class which numbers I expect you to memorize, and there aren't many this time. This means that as you read, you should not encounter the numerous numbers in the text as items to be memorized, only as other forms of words or as symbols being used to illustrate some point or give you a mental picture of something. And speaking of mental pictures: look at the pictures in the book—they provide you with a non-verbal way of internalizing the material and becoming comfortable with it.

Since you essentially don't have to memorize numbers, names, or dates, I hope it is clear that I am mainly interested in whether you understand the ideas and can remember the most important terminology. This is extremely important for the rest of the course, since things like orbital period, various types of light (e.g. infrared), etc. will recur repeatedly as we discuss astronomical phenomena. Consequently the material on this exam serves mostly as the basis for your understanding the rest of the material in the course. For that reason, you should be especially diligent and thorough about your preparation for this exam and the next, or you will feel negative effects later.

Be sure to bring a number 2 pencil to the exam, and take out a blank piece of paper before the exam begins, so that you can record the letters corresponding to your answers. You will be turning in the exam itself, and recording answers on a scantron bubble sheet.

Here are some sample questions:

1. A galaxy like ours (the Milky Way) is larger than the distance to the nearest stars by a factor of roughly
a) 100 b) 10^4 c) 10^7 d) 10^9

2. On the Earth, the seasons are controlled mostly by the tilt of the Earth's axis because we are in a nearly circular orbit. What if you lived on a planet with little tilt, but on a very eccentric orbit, so that seasons were controlled by how close your planet comes to its sun? In that case summer would be _____ than winter.
a. shorter b. longer c. they would be the same.
[Note: this is a very simple question—you don't have to understand anything about seasons or the tilt of the Earth's axis to answer it.]

3. Star A has a parallax which is 5 times larger than star B. Which of the following statements is true?
a) Star A is 5 times nearer than B. b) Star A is 5 times more distant than B.
c) Star A is intrinsically brighter than B. d) Star A is intrinsically fainter than B.
e) None of the above.

4. For a planet in orbit around some star, how does orbital speed at aphelion (point of greatest distance) compare to the speed at perihelion (point of smallest distance)?
a) same b) higher c) lower
d) depends on the mass of the planet e) depends on the mass of the star

5. According to Newton's First Law of Motion, if the sun's gravity were suddenly to turn off, the planets would
a) continue to orbit in circular paths. b) continue to orbit in elliptical paths.
c) move in a straight line. d) be unaffected: Newton's First Law does not deal with gravity.

6. Which of the following is the dominant type of radiation emitted by objects at room temperature? Which has the greatest frequency? Energy?
a) infrared b) x-rays c) gamma rays d) radio waves e) visible light

7. Which of the following describes how the intensity of radiation emitted from a black body varies with frequency?
a) All the radiation is emitted at one frequency.
b) The intensity peaks at one frequency and falls off above and below that frequency.
c) The intensity has a minimum at one frequency and rises above and below that frequency.
d) The radiation emitted is constant at all frequencies.
e) A black body emits no radiation.

8. A star much hotter than the sun will emit most of its energy as _____ radiation.
a) radio b) ultraviolet c) visible d) infrared