

**Fall 2005 ASTR 1120-001 General Astronomy: Stars & Galaxies.
Problem Set 3. Due Th 29 Sep**

Your name:

Your ID:

Except for the tutorial, for which you should submit answers on line, please show your working on this sheet, and write your answers on this sheet. Attach extra sheets if you need them. If you mess up, you can get another copy of the problem set at http://casa.colorado.edu/~ajsh/astr1120_05/prob.html. Express your answers in scientific notation.

1. Tutorial on the Stellar Evolution

Go to <http://www.astronomyplace.com>, press on the Cosmic Perspective 3rd Edition icon, log in. Join our class 'cm651430', so that you can record your work and submit it for grade on line. Click on Tutorials, and do the tutorial on Stellar Evolution. You can redo the tutorial as often as you like, to improve your grade.

Your score should be recorded automatically, but as a double check against your score disappearing into a black hole:

My score was _____.

Your feedback on the experience:

What I liked about the tutorial was:

What I did not like about the tutorial was:

2. Parallax

As of today (18 Sep 2005) there are 138 planetary systems containing 157 planets around main sequence stars other than the Sun. The latest data can be found in the Extra-solar Planets Catalog at

<http://cfa-www.harvard.edu/planets/catalog.html>

To date the nearest star with a planet is ϵ Eridani (HD 22049), the 9th nearest star system beyond the Sun. ϵ Eri is 0.8 times the mass of the Sun, and the planet is 1.2–4.7 times the mass of Jupiter, with a 6.9 year period. The Hipparcos satellite measured a parallax <http://www.rssd.esa.int/SA-general/Projects/Hipparcos/table361.html> of 0.31075 ± 0.00085 arcseconds (the \pm number is the uncertainty in the measured parallax). What is the distance to ϵ Eri?

For 1 point extra credit, figure out also the uncertainty in the distance, and write your answer as $x \pm y$ parsecs.

ϵ Eri is _____ parsecs away from us.

3. Light travel time

As you discovered in problem set one, 1 parsec = 3.261 lightyears. How many years would it take for a light signal to get from Earth to ϵ Eri and back?

A light signal from Earth to ϵ Eri and back would take _____ years.

4. Inverse Square Law

η + χ Persei is a pretty double open cluster of stars which can be seen with binoculars in the northern sky. A main sequence A star (just like Vega or Sirius) appears in η + χ Persei to a factor of 10^6 fainter than Sirius. The distance to Sirius is known from its parallax to be 2.63 parsecs away. How far away is η + χ Persei, in parsecs? [Hint: use the inverse square law of distances. You can assume that Sirius and the A star have the same luminosity.]

η + χ Persei is _____ parsecs away from us.

5. Main Sequence Fitting

The Hyades and the Pleiades are two of the best-known open star clusters. The Hyades star cluster is the V-shaped system of stars about 10 degrees to the right and upward from the Orion constellation, about half way between Orion and the Pleiades. Historically, determining the distance to the Hyades cluster was a crucial step up the Cosmic Distance Ladder. Its distance turns out to be about 40 parsecs away. The main sequence in the Pleiades appears about a factor of 10 fainter than the main sequence in the Hyades. How far away is the Pleiades cluster?

The Pleiades cluster is _____ parsecs away.