Astronomy 160b — Spring 2007
Problem Set #1 — due January 25 in class

If you are having trouble, or just want to talk about the class or related topics, by all means come to CB's office hours 9:30-11 Monday at Starbuck's, or to the TFs' office hours on Wednesday, or send a query to the Forum on the Classes server.

0. (1 point) Read the problem set policy (linked from the syllabus). Then answer the following true/false questions:

    a) You can drop your lowest problem set score.
    b) You can work on problem sets with other students, provided you split up before you write down your answers.
    c) You can hand in a problem set 24 hours late and lose only one point.
    d) You can consult with a tutor or TF about the precise wording of your answers on the problem sets.
    e) You can hand in a problem set a week late and only lose two points.

1. (5 points) Express the following in simple scientific notation to one-digit accuracy (that is, in the form $N \times 10^m$, where N and m are integers). Please do not use calculators, and show your work.

    a) 8×365.24
    b) $5 \times 6 \times 10^{-3}$
    c) $\sqrt{4 \times 10^6}$
    d) $1/(3 \times 10^{-2})$
    e) $(1.2 \times 10^8)^{1/3}$

2. (3 points) Neptune's moon Nereid has an orbital period of almost exactly one Earth year. If the mass of Neptune is around 10^{26} kilograms, what is the semi-major axis of Nereid's orbit?

3. (3 points) Consider a Sun-like star, which is orbited by a planet with a period of 80 years. If the separation of the star and the planet appears to be 20 arc seconds, how far away is the star?

4. (2 points) In fact, there is such a star (α Centauri) except that its companion isn't a planet, but another Sun-like star. Does this fact make any difference in the forgoing calculation? Explain.

5. (6 points — absolutely no longer than 2 double-spaced pages!). There's been a lot of fuss recently about the status of Pluto, and whether it should be described as a planet or not. You can find some useful discussions of this issue through the "links" section of the course website, and I'll mention in it class on Tuesday. To what extent, and in what ways, is this a *scientific* controversy? (Note: this is not a question that has a specific correct answer — what we're interested in here is a thoughtful well-informed discussion, not a particular response.)