ASTR450 Homework # 1 – Vectors and Coordinate Systems
Due Thursday, February 8

Homeworks will be handed out each Thursday and are due on the following Thursday. You are welcome to work together on the problems, but try them on your own first as practice for the midterm and final. I will try to have homeworks graded and back to you within a week.

1. Danby: Problem 8, Page 19 (Moderate). For parts a) and b), use just basic vector operations (do not use the vector definition of the center of mass - this is what you are trying to prove). For b), use this definition of the center of mass: it lies along a line joining the two masses and its location along this line is such that the mass times the distance to the center of mass is equal for both bodies. For part c), you can use the fact that the centroid is twice as far from each vertex as from the opposite side.

2. Danby: Problem 15, Page 19 (Easy). Directional cosines are simply the dot product of the given unit vector with the coordinate axes $\hat{x}$, $\hat{y}$, and $\hat{z}$.

3. Danby: Problem 13, Page 21 (Easy). You are done when you can describe in words the shape of the set of all points that satisfy the equation.

4. Danby: Problem 1, Page 29 (Hard). As above, describe most general type of motion that satisfies each of the equations. Part g) is nearly impossible, but it is possible to make progress. Get as far as you can with it!

5. Danby: Problem 6, Page 29 (Easy). Yes, that is a cotangent.