## ASTR450 Homework # 3 – Central Force Motion Due Thursday, September 21

Reading: Danby's Chapter 4 and Appendix A.

1. Danby: Page 82, Problem 1 (Moderate). Consider all finite values of C, the total energy per unit mass.

2. Danby: Page 82, Problem 2 (Moderate). Assume the solution for a conic and test to see if it satisfies the equation for  $d^2r/dt^2$  (Eq. 4.1.7).

3. Danby: Page 83, Problem 4 (Moderate). Afterwards, test the equation at the turning points  $\dot{r}=0$ .

4. Danby: Page 83, Problem 5 (Moderate). Cross out the words "or otherwise"! Apsidal distances are the radial extrema (turning points) of the orbit. You can use the results from the last problem to help you derive C and h.

5. Danby: Page 83, Problem 6 (Moderate). After assessing the stability of each of the four forces, test your answers numerically with the Central Force Integrator program which can be reached from the class web site. Sketch (or print out) one or two example orbits showing typical behavior for each of the four force laws. Choose  $v_{\theta} = 0.999$  for more visually appealing orbits.