ENAE 791
Spring, 2004

Problem Set 2
Due April 1, 2004

Using the basic state equations as derived in class, write a program which will numerically integrate the equations of motion for a spacecraft. You may use Runge-Kutta integration in a programming language of your choice, or in a spreadsheet; you may alternately use the numerical integration routines in Matlab. Verify that your simulation works for the case of orbital motion around the Earth by integrating spacecraft motion from the following initial conditions:

r_0=9600 km
v_0=6571 m/sec
γ_0=+11.32°
μ=398,604 km^3/sec^2

1. Calculate the standard orbital parameters (apogee, perigee, eccentricity, and period) for this orbit

2. Numerically integrate the equations of motion throughout a complete orbit. Verify that the parameters you calculated above are accurately predicted by the numerical simulation.