GRAD590F SPR. ’08, Homework 2

•Look in the .zip file of digital globe metadata for the file *dg.eph.* Locate ephemeris point number 5. Note the time of point number 1 and the interval in order to obtain UTC for point 5. Image coming by mail – read Educational license terms.

•Using that information, plus relevant time and earth rotation data from *www.iers.org*, compute the 3x3 rotation matrix that transforms coordinates between the ECF & ECI systems. You may also use the matlab function *nutation.m* and the associated data file *iau1980n.txt* that I am providing. That gives you N, you need to compute P, Θ, Π

•Transform XYZ (ECF) for ephemeris point 5 to ECI. The transform the velocity vector to ECI.

•Once you have position & velocity in ECI, compute the kepler elements (*): Using mean earth radius of 6367km, compute the altitude of the satellite (assume circular orbit). Also compute the period. Compare altitude, period, and inclination to the published values in the front of the Digital Globe QuickBird “Product Guide”

•Kepler elements: $\Omega, i, \omega, f, a, e, E, M$

•Convert the kepler elements back to a state vector, confirm that you get the same ECI state vector.