1086-70-2108 **Elizabeth A Zollinger*** (ezollinger@sjcny.edu), 245 Clinton AVE, St. Joseph's College, Brooklyn, NY 11205. *Averaging theory for finding analytically periodic orbits for the 3-body problem.*

Building on the work by Jaume Llibre for finding analytically periodic orbits of differential equations in the Lorenz model and those in Chua's class, we apply the averaging theory to the Newtonian n-body problem. Starting with the family of equal mass 3 bodies (which can be pictured nicely on the shape sphere) we compute eigenvalues to verify that periodic orbits must exist. Connections are then made to the geometric problem with the the 3 bodies starting at collinear and ending, at $t = 1$, in an isosceles triangle. (Received September 24, 2012)