Physics 412 - Fragile Name:_____
Project (assigned 4/1/13; due 4/17/13)

1. Following the example for FRW Cosmological models provided on the author's webpage (http://web.physics.ucsb.edu/∼gravitybook/mathematica.html), write a Mathematica notebook to calculate study Einstein's static universe model. Consider a closed ($k = +1$) FRW model containing a matter density ρ_m, a vacuum energy density corresponding to a positive cosmological constant Λ, and no radiation. Demonstrate the conditions for which this model universe is static (the scale factor does not change with time). Further demonstrate that if ρ_m differs only slightly from the density necessary for a static universe, that the universe will either expand to infinite volume or collapse to a singularity. In other words, Einstein's static universe solution is unstable! Hey, even Albert Einstein can have a bad day.