Physics 786, Spring 2017
Problem Set 9 Due Thursday, April 27, 2017.

Your final paper is due the same day as this (short) assignment.

1. *FRW Universe with Cosmological Constant*

If Einstein's equations are modified to include a cosmological constant:

$$R_{\mu\nu} - \tfrac{1}{2}g_{\mu\nu}R - \Lambda\, g_{\mu\nu} = -8\pi G_N T_{\mu\nu},$$

then the scale factor of the FRW universe satisfies

$$\dot{R}^2 + k = \frac{8\pi G_N}{3}\rho R^2 + \frac{\Lambda}{3}R^2.$$

Show that if Λ is large enough a $k = 1$ universe can expand forever.