Math 635 Hwk 3

Problem 1. *Determine the power P that must be applied to keep a ship of length l moving at a constant speed s. Assume P depends on the density of water ρ, the acceleration due to gravity g, the viscosity of water ν (in length squared per unit of time), as well as l and s. Show that*

$$\frac{P}{\rho l^2 s^3} = f(Fr, Re),$$

where the Froude and Reynolds numbers are, respectively,

$$Fr = \frac{s}{\sqrt{lg}} \quad and \quad Re = \frac{sl}{\nu}.$$

Problem 2. *Show that the Lorenz equation is chaotic by showing that nearby initial data produces very different solutions over time. Plot the difference of the two solutions as a function in time.*