Homework 4

Due Thursday September 27

1. Download the code `lorenz.py` available from the HWS page. This code simulates the lorenz model which is a extremely simplified model for fluid flow in a heated liquid. There are three variables labeled `x,y,z` which correspond to temperature, density and velocity of the liquid. The display shows a plot of `x` and `z` as time increases. The parameters `sigma`,`b` and `r` correspond to various parameters characterizing the liquid with the parameter r in particular corresponding to the temperature difference maintained across the liquid.

2. Run the code and make a screen capture of what you see. Use the parameters `sigma=10.0,b=8/3,r=5`. Is the behavior chaotic here ? This behavior corresponds to smooth convective behavior in the liquid.

3. Now put `r=25.0` and record what you see. Is this behavior chaotic ? By playing with values of `r` in the region `r=23.0--25.0` try to estimate where the transition to chaos takes place.