Computational Physics – HW #0
Dimensional Analysis

1. Astrophysics–variable stars. It is observed that there exist variable stars (the brightness of the star varies with time). Using dimensional analysis determine how the variable star's frequency of oscillation scales with the star's radius. In considering what to include in your analysis consider what is likely to drive the restoring force in this oscillation.

2. Water waves–dispersion. Walk over to Brittan lake and toss a pebble in and watch the small waves spread out. If you now toss in something larger (e.g., a larger rock) you will excite longer wavelength waves. These longer waves will not travel at the same speed as the shorter waves. Then the wave speed depends on the frequency/wavelength of the wave it is called dispersion. Use dimensional analysis to determine how the frequency of the wave depends on the wavelength of the wave, and from this how the speed depends on the wavelength. Again in deciding what to include consider what force is responsible for the restoring force.