GEOL/ENVS3520 Homework 1:
Due in class Tuesday 27 January

1) (**5 pts.**) In our first overview lecture we looked at a simple projection that suggested a doubling (at least) of the current global energy demand (i.e from ~15 to ~30 terraWatts or quadrillion Watts) by 2050. This, we saw, was driven by a combination of global population growth and the drive for increased prosperity in the developing world, where most population growth will occur. To get a crude handle on just how much pressure population growth in the developing world will exert on the future energy demand, respond to the questions below:

a) The global population is now about 6.7 billion persons. When can we expect it to be 7.7 billion (that is how long 'til we have added the next billion)? Please give the source of your answer.

b) Assume all 1 billion persons are entering the energy-impoverished developing world. If we gave each person a 60W bulb, how much power would be required for all of the next billion to run their bulbs? Now assume that on average they only need the lights on for 4 hrs per day. What is the revised power demand.

c) A typical large coal-fired power plant can supply 500 megaWatts (i.e. 500 million Watts). How many such coal-fired power plants would be needed just so the "next billion people" can turn on the light for 4 hrs a day?

2) (**5 pts.**) Antennae work best when they are sized to match the spacing between the waves (i.e. wavelength) they are designed to receive. What size antenna would you build to optimize reception of KGNU broadcasting at a frequency of 88.5 MHz? A Hertz (H) is an international unit that equals 1 cycle (or wave) per second, and one MegaHertz is therefore one million waves/second. *Hint: You will need to know the speed of light. It may help to note the units in your calculation and make sure they balance*. Be sure to show your work.