PHY102
Physics of Music
Spring 2008
Due before class on February 15

1) You hear a thunder 4 seconds after you see the lightning.
   Estimate how far from you the thunder occurred.

Light moves much faster than sound so we can assume it see the
lightning bolt when it happens. The distance the sound can
travel in 4 seconds is given by approximately by 340 m/s x 4 s =
1400 m. So, if the thunder happened 1400 m away from us we
would hear it 4 seconds later.

2) Is sound on air faster or slower than:
   • Fast car faster
   • Small propeller airplane faster
   • Commercial jetliner faster
   • Jetfighter slower
   • Light much much slower

3) *Estimate* the total number of pianos keys in the US. Aim at a
   number within a factor of 10 or so from the correct one.
   (This question may seem strange and, in a sense, it is. It is
   however a classic and it's been known to be used at job
   interviews for business consulting positions and graduate
   school admissions in physics, among other places.)

There are many ways of approaching this question. One way
would be:
Population of the US = about 300.000.000=3×10^8
Number of households in the US = about $3 \times 10^8 / 5 = 6 \times 10^7$

Fraction of households with a piano = about 1/5

Number of keys in one piano = about 100

Number of piano keys in the US = about 100 1/5 $6 \times 10^7 = 10^9$