Physics 22 Problem Set 10

Harry Nelson

Due Wednesday, June 13 at the final

This problem set continues with relativity; review Chapter 12 and sections 13.1 and 13.2, pp. 490-500.

The **Final is Wednesday, June 13, 4-7pm, in 1640 Broida.**

The instructor is Harry Nelson, the TA is Joel Varley. A web page for the course is set up at http://hep.ucsb.edu/courses/ph22.

We meet MWF 1:00-1:50pm in 1640 Broida. There are **two sections**, attendance at **both** is mandatory. Joel Varley's section will take place Friday 11:00-11:50pm in 1802 Psychology, and Harry Nelson's will take place Friday 2:00-2:50pm in 2129 Girvetz. Harry Nelson's office hours will follow section until 5:00pm on Friday, either in 2129 Girvetz (if possible) or in the PSC. Joel Varley's office hours will will take place in the Physics Study Room (1019 Broida) on Tuesday from 9:00am to 10:00am, Thursday from 9:00am to 10:00am, and Friday noon-1:00pm.

Please make your work neat, clear, and easy to follow. It is hard to grade sloppy work accurately. Generally, make a clear diagram, and label quantities. Derive symbolic answers, and then plug in numbers after a symbolic answer is available.

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1. K&K 12.13
2. A buoy off Isla Vista emits sound with a frequency, in its rest frame, of $\nu_0 = 500.0\,\text{Hz}$. Take the speed of sound in air to be $w = 330\,\text{m/s}$.
   (a) What will be the frequency you hear change if a strong wind of 20 miles/hour blows from the buoy to your ear?
   (b) What will be the frequency you hear if you run away from the buoy at a speed of 20 miles/hour?
   (c) What will be the frequency you hear if the buoy runs away from you at a speed of 20 miles/hour?
3. With what velocity would a TV transmitter have to move to change the frequency you detect from Channel 4 (69 MHz) to Channel 3 (63 MHz)?
4. K&K 13.1
5. K&K 13.4
