AY 7B Assignment 1

due: Tuesday, January 31

Problem 1: Consider the (non-relativistic) Doppler shift that occurs for sound waves in air. Let ν_{o} be the frequency of sound emitted by a source S. Let ν' be the frequency detected by a receiver R.

(a) Suppose R is stationary with respect to the air, while S is moving away at speed $v = \beta c_s$, where c_s is the sound speed and $\beta < 1$. Find the relationship of ν' to ν_o in this case. You should find that ν'/ν_o is a simple function of β .

(b) Now suppose S is stationary with respect to the air, and that R is moving away at speed $v = \beta c_s$. Again, find the relation between ν' and ν_{\circ} .

Hint: Imagine that S emits two discrete pulses. The time interval between their emission is $\tau_{\circ} = 1/\nu_{\circ}$.

Problem 2: Carroll & Ostlie, Problem 4.5

- Problem 3: C & O, Problem 4.6
- **Problem 4:** C & O, Problem 4.11. Do part (a) only.
- **Problem 5:** C & O, Problem 4.13
- **Problem 6:** C & O, Problem 17.6
- **Problem 7:** C & O, Problem 17.7