Ph 136a
Applications of Classical Physics

Problem Set 3

Due **before 1:00pm** Wednesday 28 Oct, 2020

Readings: Readings for this week are Section 3.7 of Chapter 3, and Sections 4.1-4.9 (plus 4.10.2 and 4.11, which are very interesting but not examinable in this course) of Thorne & Blandford *Modern Classical Physics*, hereafter called TBMCP.

Non-Collaboration Problem Notice that problem 4 is a non-collaboration problem: you must solve this problem on your own (as if it were an untimed quiz), without discussing it with other students, or with the TA (see the collaboration and grading policy for how these will be graded and used: http://www.its.caltech.edu/~esp/ph136a/Policies.pdf)

Submitting your homework Please upload your completed homework solutions as a `pdf` file to Canvas. If that fails to work, you may instead email the file to the TA, `twang3@caltech.edu`, with the subject line `ph136 homework 3`. Note that Caltech email will reject attachment sizes larger than 10Mbyte, so be conscious of scanning parameters!

Homework Problems: (51 points total)

1. **TBMCP Problem 3.17 (12 points: 4+4+4)** *Solution of Diffusion Equation in an Infinite Homogeneous Medium*

2. Do ONE of the following two problems (whichever is more interesting to you):

    a) **TBMCP Problem 3.19 (15 points: 3+3+3+3+3)** *Viscosity of a Monatomic Gas*

    b) **TBMCP Problem 3.21 (15 points: 4+6+5)** *Neutron Diffusion in a Nuclear Reactor*

3. **TBMCP Problem 4.5 NONCOLLABORATION (12 points: 3+3+3+3)** *Entropy of Thermalized Radiation Deduced from Entropy per Mode*

4. **TBMCP Problem 4.8 (12 points: 3+3+3+3)** *Entropy of Mixing, Indistinguishability of Atoms, and the Gibbs Paradox*