PHY 140Y – FOUNDATIONS OF PHYSICS
1999-2000
Problem Set #4

HANDED OUT: Friday, November 19, 1999 (in class).

DUE: **1:00 PM, Thursday, December 2, 1999 (in class).**
Late penalty = 5 marks/day (which also applies to weekend days!) until 1:00 PM, Monday, December 6, after which it will not be accepted (as solutions will then be available in tutorials and on the WWW).

NOTES: Answer all questions. Total marks = 100.
50% will be awarded for making a reasonable attempt at all questions.
50% will be awarded for the answers to a selected subset of the questions.
Marks will given for workings and units, as well as for final answers.

QUESTIONS:
(from *Physics with Modern Physics*, Third Edition, by Wolfson and Pasachoff)

1. Chapter 38, Problem 2, Page 1039

2. Chapter 38, Problem 10, Page 1040

3. Chapter 38, Problem 14, Page 1040

4. Chapter 38, Problem 18, Page 1040

5. Chapter 38, Problems 22, 23, and 24 , Page 1041

6. Chapter 38, Problem 46, Page 1042

7. Chapter 38, Problem 54, Page 1042

8. Chapter 38, Problem 62, Page 1043

9. The radius of a galaxy is L. (a) How fast would a spaceship have to travel to cross the entire galaxy in a time T, as measured from within the spaceship? Express the speed in terms of the speed of light c. (b) How much time would elapse on Earth during the traversal? (c) Evaluate the expressions derived in (a) and (b) for $L=3.00\times10^{20}$ m and $T = 3.00\times10^{2}$ years.

10. A physics professor on Earth gives an exam to students who are on a spaceship travelling at speed V relative to Earth. The moment the spaceship passes the professor, she signals the start of the exam. If she wishes the students to have time t_o (in the spaceship frame) to complete the exam, how long should she wait before sending a light signal telling them to stop?