DUE: WEDNESDAY JANUARY 30, 2008

Assigned reading: Giancoli, Chapter 14, sections 3–8, and Chapter 15, sections 1–2.

MIDTERM ALERT: The first midterm exam will be given on Friday February 1, 2008 in Thimann Lecture Hall 3 from 9:30–10:40 am. The midterm will test you on material from chapters 13, 14 and the first two sections of chapter 15 of Giancoli. This will be a closed-book exam. However, during the exam you will be permitted to consult one 8 1/2" $\times$ 11" sheet of paper of personal notes (two-sided is fine). Feel free to include on this sheet the key formulae and concepts that you will find most useful for working out the exam problems. You should also bring a calculator, as some of the problems will require numerical work.

Practice problems for the midterm exam will be available early next week. The solutions to these problems will be discussed in a special review session, which will be led by the discussion TA, Jeff Jones. This review session is tentatively scheduled for Thursday January 31 in the early evening. Final details will be announced in class and on the course website.

1. True/false questions: For each of the following statements, indicate whether the statement is true or false. Briefly explain your reasoning (for example, if false, provide a counter-example).

   (a) Consider a mass oscillating at the end of a (real) massive spring with spring constant k. The true period will be smaller and the true frequency will be larger than the corresponding period and frequency of a mass oscillating at the end of an idealized massless spring with the same spring constant k. [*HINT*: apply energy conservation to the oscillating mass attached to the massive spring.]

   (b) If a pendulum clock is accurate at sea level, it will lose time when taken to higher altitude.

   (c) A child sits on the seat of a playground swing and begins to swing. If the child then rises up from a sitting to a standing position (while swinging), then the period of the swing will decrease.

   (d) A thin uniform rod of mass m is suspended from one end and oscillates with frequency f. If a small sphere of mass $2m$ is attached to the other end, the frequency will increase.

(e) A tuning fork of natural frequency 264 Hz sits on a table at the front of a room. At the back of the room, two tuning forks, one of natural frequency 260 Hz and one of 420 Hz are naturally silent. But, when the tuning fork at the front of the room is set into vibration, the 260 Hz fork spontaneously begins to vibrate but the 420 Hz fork does not.

(f) Consider a transverse wave propagating down a cord. The speed of the wave is equal to the speed of a tiny piece of cord located at any point along the cord.

To earn full credit on the following problems, you must exhibit the steps that lead to your final result. The graded homework will be based on the clarity of your method of solution as well as on your final answer.

2. Giancoli, Chapter 14, problem 30
3. Giancoli, Chapter 14, problem 37
4. Giancoli, Chapter 14, problem 40 [*HINT:* Do not forget to take the rotational kinetic energy into account; cf. Chapter 10, sections 8 and 9 of Giancoli]
5. Giancoli, Chapter 14, problem 44
6. Giancoli, Chapter 14, problem 52
7. Giancoli, Chapter 14, problem 56
8. Giancoli, Chapter 14, problem 61
9. Giancoli, Chapter 14, problem 63
10. Giancoli, Chapter 15, problem 10
11. Giancoli, Chapter 15, problem 14