DUE: WEDNESDAY FEBRUARY 6, 2008

Assigned reading: Giancoli, Chapter 15, sections 3–9.

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) The speed of sound in air increases as the temperature is increased from $T = 0^\circ$ C to $T = 20^\circ$ C.

   (b) If damping is ignored, then the amplitude A of circular water waves (as shown in the picture on the top of p. 395 of Giancoli) decreases as the square root of the distance r from the source, i.e., $A \propto 1/\sqrt{r}$.

   (c) Two linear waves have the same amplitude and speed, and otherwise are identical, except one has half the wavelength of the other. The wave with the shorter wavelength transmits less energy.

   (d) If a sinusoidal wave on a two-section cord (as depicted in Fig. 15-19 of Giancoli on p. 409) is inverted upon reflections, the transmitted wave has a longer wavelength as compared with the original incoming wave.

   (e) When a standing wave exists on a string, the vibrations of the incident and the reflected wave cancel at the nodes. This indicates that energy is being lost at the location of the nodes.

   (f) Consider a rope attached to a fixed point on the wall. Pull the rope taut and then wiggle the free end of the rope (either by an up or down motion of the hand or either a mechanical oscillator) to produce standing waves. The amplitude of the standing waves cannot be greater than the amplitude of the vibrations that set up the standing wave pattern.

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

2. Giancoli, Chapter 15, problem 19

3. Giancoli, Chapter 15, problem 21

4. Giancoli, Chapter 15, problem 24
5. Giancoli, Chapter 15, problem 28
6. Giancoli, Chapter 15, problem 30
7. Giancoli, Chapter 15, problem 34
8. Giancoli, Chapter 15, problem 38
9. Giancoli, Chapter 15, problem 42
10. Giancoli, Chapter 15, problem 50
11. Giancoli, Chapter 15, problem 64