Name:

Physics 3100: Example Exam Chapters 1-11
Real Exam Date 3 October 2001
14 short answer questions worth 5 points each.

1. Explain the scientific method.

2. What is the difference between a length and a displacement?

3. Define speed.

4. Name and describe three derived physical quantities.

5. What is work in the physics sense?

6. What is the intensity?
7. Why does a sound get softer as you move away from the source?

8. Explain the difference between a narrow and broad resonance.

9. What is a transducer?

10. What is constructive interference between waves?

11. Describe beats and how to calculate the beat frequency.

12. What are the features of an harmonic complex sound?

13. What are the wavelengths allowed for standing waves in an open-open tube?
14. What determines the loudness of a complex sound?

3 problems worth 10 points each.

1. Draw diagrams of a mass on a frictionless pendulum in a vacuum undergoing simple harmonic motion. On the diagram indicate where the mass is not moving, where it is moving the fastest, and the amplitude of the motion. Explain how this motion demonstrates conservation of energy.
2. A compound vibrator system has natural modes with frequencies of 100 Hz, 106 Hz, and 200 Hz. All these modes are driven with zero phase and they have amplitudes of 1, 0.5, and 0.1 cm respectively. Write the equation that describes the motion of the system as a function of time. Sketch the frequency spectrum for this system. Is the motion of the system periodic or chaotic? Why?
3. Draw a diagram of the second mode of standing waves in an open-open tube. Indicate the position of the nodes and antinodes. The average pressure in the tube is $10^5$ Pa, the density of the gas is $0.00025$ kg/m$^3$, and the tube is 4 m long. What is frequency of this mode?