

Math 256
Applied Honors Calculus IV: Differential Equations, Fall 2007

Homework Set 5
Due Friday, October 12, 2007

Recommended Reading: *Feynman Lectures on Physics* Volume I, Chapter 23 is an alternate account of the material in sections 3.8 3.9 on oscillations free and forced and resonance. The material at the end illustrating the ubiquitous nature of these phenomena is very interesting.

Problems to Study:

- practice for section 3.8. 204/24, 25, 26, 28, 29
- practice for section 3.9. 214/5,6,7,8,9,10,13,
- Phase plane. 214/20,21,22,23 These problems introduce several ways to graphically present and/or visualize the solutions of second order equations. The same ideas will also appear when we output the computations made with MATLAB's `ode45` applied to second order equations. We will do that during the week Oct. 8-12.

Problems to Hand In:

- 204/19. Overdamped and critically damped free oscillations can have no more than one oscillation.
- 204/20. For some initial data, they don't oscillate at all.
- 204/27. Modelling oscillations in a floating body. A second application of similar ideas is to compute the fraction of an iceberg that is underwater when at rest, from its specific gravity.
- 214/17. Experience with steady state sinusoidal response of damped system.
- 214/18. Experience with undamped oscillators and resonance.