R. Quimby
Physics Dept., Olin 128
rsquimby@wpi.edu

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PH2201 – Intermediate Mechanics I
Study Guide 2

Readings

Topic	Book/section	Comments
Damping forces	Kleppner 3.6	Study examples 3.8, 3.9
	Taylor 2.1-2.4	Taylor gives the most info on this topic
	Morin 3.3	See example (dropped ball) on p. 63
Undamped oscillations	Kleppner 3.7	Study examples 3.10, 3.11 (skip Note 3.1 on pp. 107-109)
	Morin 4.1	Reviews mathematics of differential equations
	Morin 4.2	Free oscillations with no damping
	Taylor 5.1-5.2	Free oscillations with no damping

Practice Problems

Note: Here are some problems from Morin that you can try to solve as a way of helping you to learn the material. The detailed solutions to these problems are given in Morin, and your solutions to these problems are **not to be turned in for grading**. In order to obtain the most benefit from these problems, it is strongly suggested that you give them a good try before looking at the solutions. You will likely find some of these problems to be quite difficult. Getting stuck on these problems is a good thing! It is only by getting stuck, and then finding out why you got stuck, that you really learn the material.

Chapter 3: problem 22

Chapter 4: problems 5, 6

Homework Problems

Homework set 2 is **due Tuesday Sept. 8:**

1. A particle of mass m is moving in the +x direction, and is subject to a force in the x direction of $F_x(\mathrm{v}) = -b\mathrm{v}^2$, where b is a constant and v is the particle's speed. If the initial position (at time $t = 0$) is zero, and the initial speed is v_0, find $x(t)$.
2. A particle of mass m is subject to a force $F_x(x) = kx$, with the constant $k > 0$. What is the most general form of $x(t)$? If the particle starts out at x_0, what is the one special value of the initial velocity for which the particle doesn't eventually get far away from the origin?
3. Kleppner 2.6
4. Kleppner 3.5 plus: c) Find the minimum angular speed ω such that the lower string stays tight.
5. Kleppner 3.22 (a) Draw a force diagram and obtain a differential equation for ω. [Hint: use Newton's 2^{nd} law in polar coordinates] (b) Solve this equation to determine $\omega(t)$. (c) determine the (time-dependent) force needed to pull the string.