

PHY 3221 : Intermediate Mechanics, Spring 2003

February 7th, 2003

Assignment # 5

(due Friday February 14th, 2003, at the beginning of class)

1. Consider a damped harmonic oscillator with $m = 0.05 \text{ Kg}$ and $k = 5 \text{ N/m}$. Find its motion and graph it using the initial conditions $x_0 = 0.01$ and $v_0 = 0$, for the following three values of the damping constant (remember that the damping parameter is $\beta = \frac{b}{2m}$):
 - (a) $b = 0.1$,
 - (b) $b = 1.0$,
 - (c) $b = 5.0$,
2. Problem 3.12 of Marion and Thornton's book.
3. Problem 3.22 of Marion and Thornton's book.
4. A damped harmonic oscillator with $m = 10 \text{ Kg}$, $k = 250 \text{ N/m}$, and $b = 60 \text{ Kg/s}$ is subject to a driving force given by $F_0 \cos(\omega t)$, where $F_0 = 48 \text{ N}$.
 - (a) What value of ω results in steady-state oscillations with maximum amplitude? Under this condition:
 - (b) What is the maximum amplitude?
 - (c) What is the phase shift?
5. Problem 3.24 of Marion and Thornton's book.