

Math 3280 Assignment 10, due Thursday, November 15th.

Read sections 5.4, 5.5, and 5.6 in the text.

- (1) How many times can an overdamped mass-spring system ($mx'' + cx' + kx = 0$ with $c^2 > 4mk$; c , m , and k are non-negative) with arbitrary initial conditions $x(0) = x_0$, $x'(0) = v_0$ pass through $x = 0$? What if it is critically damped ($c^2 = 4mk$)?
- (2) Find the steady-state solution of the forced, damped oscillator $x'' + x'/4 + 2x = 2 \cos(wt)$ if $x(0) = 0$ and $x'(0) = 4$. Sketch the overall amplitude of the steady-state solution as a function of w .
- (3) Rewrite the second-order differential equation $x'' + 3x' + 5x = t$ as a system of first-order differential equations. (You do not have to find the solution.)