MTH 256 Lesson 16 - Harmonic Oscillators, Period, and Frequency

1. Set up and solve a differential equation for a simple harmonic oscillator.

2. Determine a 2nd-order differential equation describing the motion of a mass-spring-dashpot system. Find a general solution to this system and then find the specific position function $x(t)$ for when $m = 3$, $c = 30$, $k = 63$, $x_0 = 2$ and $\nu_0 = 2$. Is the motion overdamped, critically damped, or underdamped? If underdamped, write the position function in the form $x(t) = C_1 e^{-pt} \cos(\omega_1 t - \alpha_1)$. Also, find the undamped position function $u(t) = C_0 \cos(\omega_0 t - \alpha_0)$ if c had been 0. Look at the different graphs for $x(t)$ and $u(t)$ to compare.