your name(s)_____

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Physics 321 Quiz #5 - Wednesday/Friday Oct. 3/5

Work in groups of 6, open notes/book/internet/mouth

A particle of mass, $m = 100$ grams, moves in a harmonic oscillator where the fundamental frequency (no damping) is $f_0 = 2.0$ Hz. The damping rate is $\beta = b/2m = 3.0$ Hz. A transient external force of strength $F_0 = 50$ N is applied only for times between $t = -2.0$ and $t = 0$ s,

$$F = F_0 \Theta(t+2)\Theta(-t).$$

Your group of 6 will divide into 3 pairs. All three pairs will calculate and graph $x(t)$ for $0 < t < 10$ s.

- Group A: Will calculate $x(t)$ using Green functions as described by Eq. (3.54), where the coefficients I_c and I_s are calculated by numerical integration.
- Group B: Will also use Eq. (3.54) but will calculate the integrals analytically. Group B will also analytically solve the answer by first finding the general solution in the region $-2 < t < 0$ by fitting the B.C. at $t = -2$, then using that solution to determine the coefficients of the general solution for $t > 0$ by matching the B.C. at $t = 0$.
- Group C: Will numerically solve the equations of motion.

The greater group will then plot all three solutions alongside one another.