Math 2C03 2021 Assignment #6 (18560161)

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1.   Question Details   ZillDiffEQ9 5.1.026. [4568119]

A 4-foot spring measures 8 feet long after a mass weighing 8 pounds is attached to it. The medium through which the mass moves offers a damping force numerically equal to $\sqrt{2}$ times the instantaneous velocity. Find the equation of motion if the mass is initially released from the equilibrium position with a downward velocity of 3 ft/s. (Use $g = 32$ ft/s^2 for the acceleration due to gravity.)

$x(t) =$ [   ]

Find the time at which the mass attains its extreme displacement from the equilibrium position.

$t =$ [   ]

What is the position of the mass at this instant?

The extreme displacement is $x =$ [   ]   feet.

Need Help?   [Read It]   [Watch It]

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2.   Question Details   ZillDiffEQ9 5.1.031. [4568277]

A mass weighing 14 pounds stretches a spring 2 feet. The mass is attached to a dashpot device that offers a damping force numerically equal to β ($\beta > 0$) times the instantaneous velocity. Determine the values of the damping constant β so that the subsequent motion is overdamped, critically damped, and underdamped. (If an answer is an interval, use interval notation. Use $g = 32$ ft/s^2 for the acceleration due to gravity.)

     (a) overdamped

     [   ]

     (b) critically damped

     [   ]

     (c) underdamped

     [   ]

Need Help?   [Read It]   [Watch It]

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3.   Question Details   ZillDiffEQ9 5.R.012. [3877307]

A mass weighing 12 pounds stretches a spring 2 feet. The mass is initially released from a point 1 foot below the equilibrium position with an upward velocity of 4 ft/s. (Use $g = 32$ ft/s^2 for the acceleration due to gravity.)

(a) Find the equation of motion.

$x(t) = $ [   ]

(b) What are the amplitude, period, and frequency of the simple harmonic motion?

amplitude [   ] ft

period [   ] s

frequency [   ] cycles/s

(c) At what times does the mass return to the point 1 foot below the equilibrium position? (Enter your answers as a comma-separated list. Let n represent an arbitrary integer.)

$t = $ [   ] s

(d) At what times does the mass pass through the equilibrium position moving upward? (Let n represent an arbitrary integer.)

$t = $ [   ] s

At what times does the mass pass through the equilibrium position moving downward? (Let n represent an arbitrary integer.)

$t = $ [   ] s

(e) What is the velocity of the mass at $t = 3\pi/16$ s?

[   ] ft/s

(f) At what times is the velocity zero? (Let n represent an arbitrary integer.)

$t = $ [   ] s

Need Help? [Read It]

4. Question Details

Find a particular solution for $x'' + 2\lambda x' + \omega^2 x = A$, where A is a constant force.

$x_p(t) =$ [   ]

Need Help? [Read It]

Assignment Details

Name (AID): **Math 2C03 2021 Assignment #6 (18560161)**
Submissions Allowed: **7**
Category: **Homework**
Code:
Locked: **Yes**
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