Math 2C03, 2021 Assignment #7 (18594304)

Question 1 2 3 4 5 6 7 8

1. Question Details ZillDiffEQ9 4.7.016. [3894084]

Solve the given differential equation.

$$x^3y''' + xy' - y = 0$$

$y(x) =$, $x > 0$

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2. Question Details ZillDiffEQ9 4.7.022. [4568028]

Solve the given differential equation by variation of parameters.

$$x^2y'' - 3xy' + 3y = x^4e^x$$

$y(x) =$

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3. Question Details ZillDiffEQ9 4.7.032. [4568016]

Use the substitution $x = e^t$ to transform the given Cauchy-Euler equation to a differential equation with constant coefficients. (Use yp for $\frac{dy}{dt}$ and ypp for $\frac{d^2y}{dt^2}$.)

$$x^2y'' - 11xy' + 36y = 0$$

Solve the original equation by solving the new equation using the procedures in Sections 4.3-4.5.

$y(x) =$, $x > 0$

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4. Question Details ZillDiffEQ9 5.1.034.EP. [4903584]

A mass of 1 slug is attached to a spring whose constant is 5 lb/ft. Initially, the mass is released 1 foot below the equilibrium position with a downward velocity of 3 ft/s, and the subsequent motion takes place in a medium that offers a damping force that is numerically equal to 2 times the instantaneous velocity.

(a) Assume the mass is driven by an external force equal to $f(t) = 8\cos(2t) + 2\sin(2t)$.

Find the initial conditions.

$x(0)$ = ____ ft

$x'(0)$ = ____ ft/s

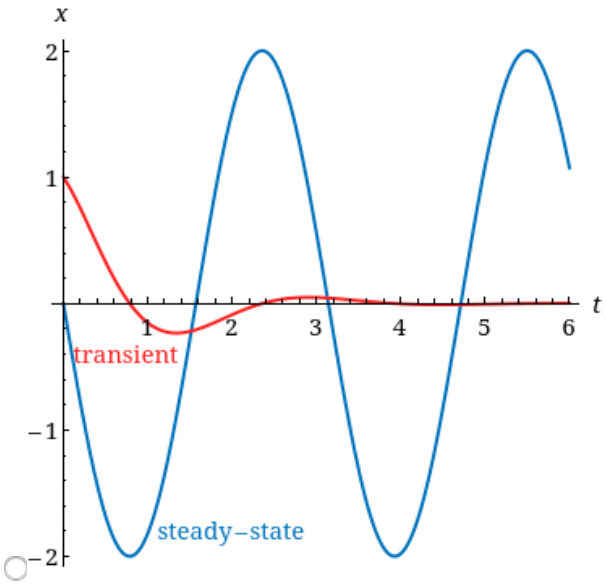
Find the particular solution.

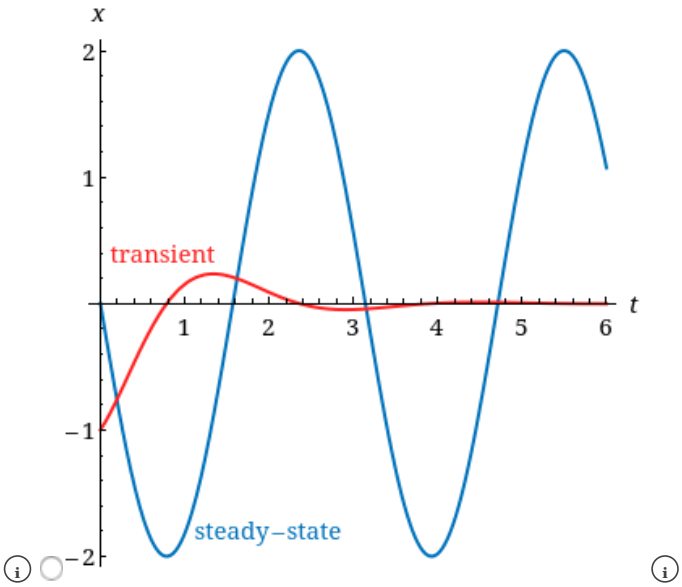
x_p = ____ ft

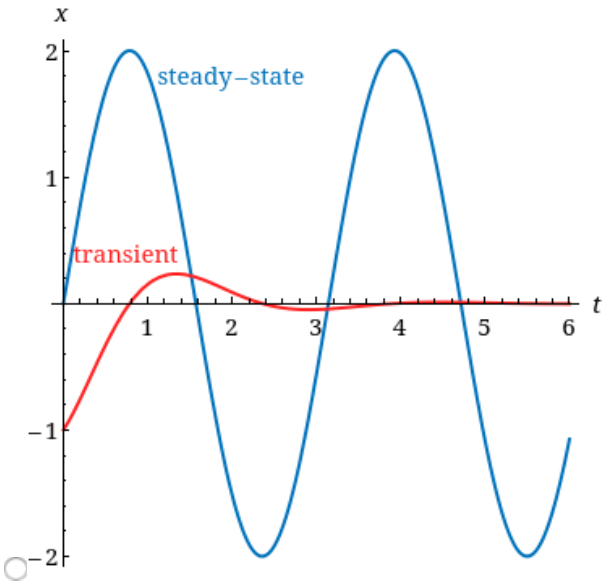
Find the equation of motion of the mass.

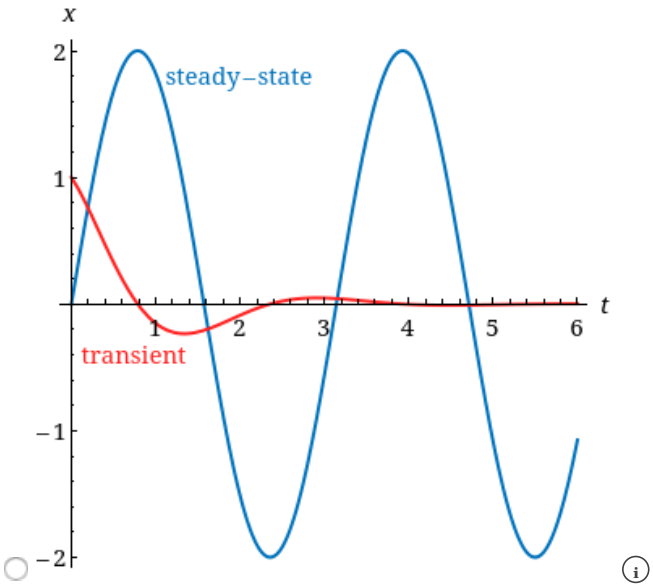
$x(t)$ = ____ ft

(b) Graph the transient and steady-state solutions on the same coordinate axes.

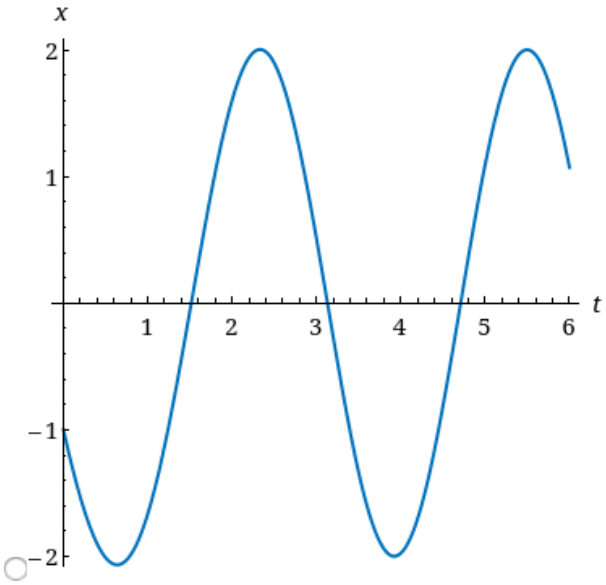


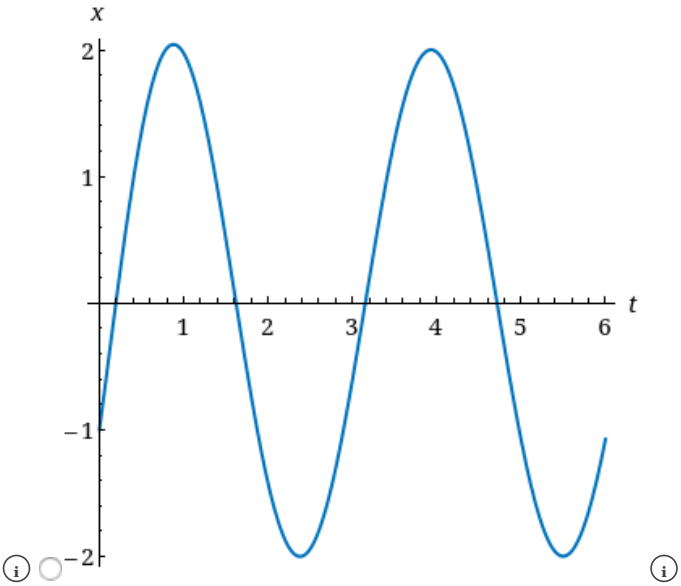


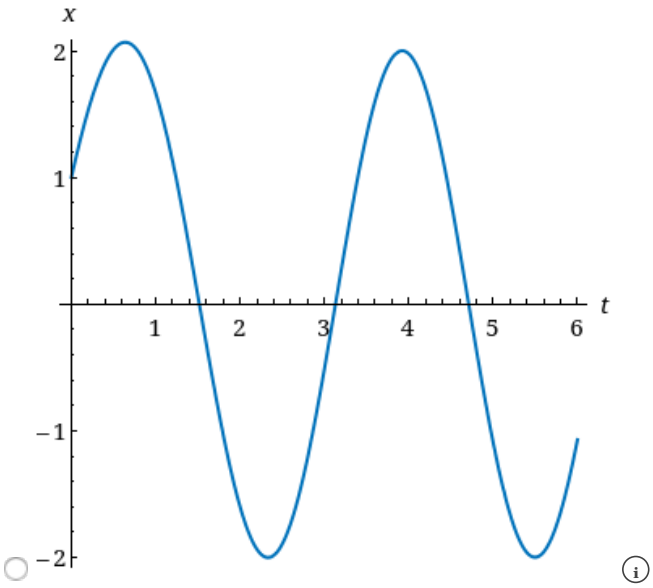


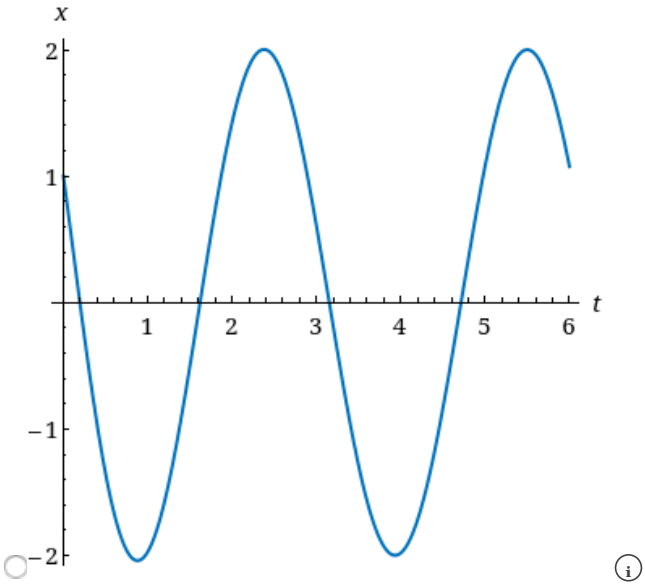


(c) Graph the equation of motion.









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5. Question Details ZillDiffEQ9 4.R.030. [3748772]

Use the procedures developed in this chapter to find the general solution of the differential equation.

$$2x^3y''' + 23x^2y'' + 59xy' + 16y = 0$$

$y =$

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6. Question Details ZillDiffEQ9 4.R.032. [3748801]

Use the procedures developed in this chapter to find the general solution of the differential equation.

$$x^2y'' - 9xy' + 25y = x^3$$

$y =$

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7. Question Details ZillDiffEQ9 4.R.034. [3894148]

Write down the form of the general solution $y = y_c + y_p$ of the given differential equation in the two cases $\omega \neq \alpha$ and $\omega = \alpha$. Do not determine the coefficients in y_p.

$$y'' - \omega^2 y = e^{\alpha x}$$

$\omega \neq \alpha$ $y =$

$\omega = \alpha$ $y =$

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8. Question Details ZillDiffEQ9 5.R.014. [3748707]

A mass weighing 8 pounds stretches a spring 6 inches. The mass moves through a medium offering a damping force that is numerically equal to β times the instantaneous velocity. Determine the values of $\beta > 0$ for which the system will exhibit oscillatory motion. (Enter your answer as a single inequality.)

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Assignment Details

Name (AID): **Math 2C03, 2021 Assignment #7 (18594304)**
Submissions Allowed: **7**
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