Math 2C03 2021 Practice pb set #7 (18594663)

Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1. Question Details ZillDiffEQ9 4.R.033. [3894150]

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.

$$y'' + \omega^2 y = \sin(\alpha x)$$

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

$\omega = \alpha$ $y =$

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2. Question Details ZillDiffEQ9 5.1.019. [3748685]

A model of a spring/mass system is $4x'' + e^{-0.1t}x = 0$. By inspection of the differential equation only, discuss the behavior of the system over a long period of time.

For large values of t the differential equation is approximated by $x'' = 0$. The solution of this equation is the linear function $x =$. Thus, for large time, the restoring force will have ---Select--- to the point where the spring is incapable of returning the mass, and the spring will simply ---Select---.

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3. Question Details ZillDiffEQ9 5.1.035. [4568307]

A mass of 1 slug, when attached to a spring, stretches it 2 feet and then comes to rest in the equilibrium position. Starting at $t = 0$, an external force equal to $f(t) = 4 \sin(4t)$ is applied to the system. Find the equation of motion if the surrounding medium offers a damping force that is numerically equal to 8 times the instantaneous velocity. (Use $g = 32$ ft/s^2 for the acceleration due to gravity.)

$x(t) =$ ft

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4. Question Details ZillDiffEQ9 5.1.037. [4568006]

When a mass of 2 kilograms is attached to a spring whose constant is 32 N/m, it comes to rest in the equilibrium position. Starting at $t = 0$, a force equal to $f(t) = 102e^{-2t}\cos(4t)$ is applied to the system. Find the equation of motion in the absence of damping.

$x(t) =$ _____ m

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5. Question Details ZillDiffEQ9 5.1.027. [3748759]

A 1-kilogram mass is attached to a spring whose constant is 21 N/m, and the entire system is then submerged in a liquid that imparts a damping force numerically equal to 10 times the instantaneous velocity. Determine the equations of motion if the following is true.

(a) the mass is initially released from rest from a point 1 meter below the equilibrium position

$x(t) =$ _____ m

(b) the mass is initially released from a point 1 meter below the equilibrium position with an upward velocity of 11 m/s

$x(t) =$ _____ m

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6. Question Details ZillDiffEQ9 5.1.029. [4568030]

A force of 4 pounds stretches a spring 1 foot. A mass weighing 3.2 pounds is attached to the spring, and the system is then immersed in a medium that offers a damping force numerically equal to 0.4 times the instantaneous velocity.

(a) Find the equation of motion if the mass is initially released from rest from a point 1 foot above the equilibrium position.

$x(t) =$ _____ ft

(b) Express the equation of motion in the form $x(t) = Ae^{-\lambda t}\sin\left(\sqrt{\omega^2 - \lambda^2}t + \varphi\right)$, which is given in (23) of Section 3.8. (Round φ to two decimal places.)

$x(t) =$ _____ ft

(c) Find the first time at which the mass passes through the equilibrium position heading upward. (Round your answer to three decimal places.)

_____ s

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7. Question Details ZillDiffEQ9 4.7.003. [3894127]

Solve the given differential equation.

$6xy'' + 6y' = 0$

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

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8. Question Details ZillDiffEQ9 4.7.005. [3894179]

Solve the given differential equation.

$x^2y'' + xy' + 49y = 0$

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

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9. Question Details ZillDiffEQ9 4.7.009. [3894211]

Solve the given differential equation.

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

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

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10. Question Details ZillDiffEQ9 4.7.011. [3894136]

Solve the given differential equation.

$x^2y'' + 9xy' + 16y = 0$

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

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11. Question Details ZillDiffEQ9 4.7.015. [3894141]

Solve the given differential equation.

$x^3y''' - 6y = 0$

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

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12. Question Details ZillDiffEQ9 4.7.019. [3894128]

Solve the given differential equation by variation of parameters.

$xy'' - 6y' = x^6$

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

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13. Question Details ZillDiffEQ9 4.7.021.MI. [3894185]

Solve the given differential equation by variation of parameters.

$x^2y'' - xy' + y = 10x$

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

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14. Question Details ZillDiffEQ9 4.7.023. [3894105]

Solve the given differential equation by variation of parameters.

$x^2y'' + xy' - y = \ln(x)$

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

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15. Question Details ZillDiffEQ9 4.7.031. [3894135]

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 $\frac{d^2y}{dt^2}$.)

$x^2y'' + 9xy' - 20y = 0$

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

$y(x) =$

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16. Question Details ZillDiffEQ9 4.7.033. [3894177]

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 $\frac{d^2y}{dt^2}$.)

$$x^2y'' + 4xy' + 2y = x^2$$

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

$y(x) =$

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Assignment Details

Name (AID): **Math 2C03 2021 Practice pb set #7 (18594663)**
Submissions Allowed: **20**
Category: **Homework**
Code:
Locked: **No**
Author: **Lia Bronsard (** bronsard@mcmaster.ca **)**
Last Saved: **Mar 6, 2021 08:38 AM EST**
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