Math 2C03 2021 Practice problem set #3 (18430419)

Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Description
stability, nonlinear models, linear first order

1. Question Details ZillDiffEQ9 2.3.004. [3876517]

Find the general solution of the given differential equation.

$$3\frac{dy}{dx} + 21y = 7$$

$y(x) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution.

Need Help? Read It

2. Question Details ZillDiffEQ9 2.3.005. [3876538]

Find the general solution of the given differential equation.

$$y' + 7x^6y = x^6$$

$y(x) =$

Give the largest interval over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

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3. Question Details ZillDiffEQ9 2.3.008.MI.SA. [4605519]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Find the general solution of the given differential equation.

$$y' = 4y + x^2 + 3$$

Give the largest interval over which the general solution is defined.

Determine whether there are any transient terms in the general solution.

Need Help? Read It Watch It

4. Question Details ZillDiffEQ9 2.3.009.EP. [4603923]

Consider the following differential equation.

$$x\frac{dy}{dx} - y = x^2 \sin(x)$$

Find the coefficient function $P(x)$ when the given differential equation is written in the standard form $\frac{dy}{dx} + P(x)y = f(x)$.

$P(x) =$

Find the integrating factor for the differential equation.

$e^{\int P(x)\,dx} =$

Find the general solution of the given differential equation.

$y(x) =$

Give the largest interval over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

5. Question Details ZillDiffEQ9 2.3.011.EP. [4903660]

Consider the following differential equation.

$$x\frac{dy}{dx} + 2y = x^3 - x$$

Find the coefficient function $P(x)$ when the given differential equation is written in the standard form $\frac{dy}{dx} + P(x)y = f(x)$.

$P(x) =$

Find the integrating factor for the differential equation.

$e^{\int P(x)\,dx} =$

Find the general solution of the given differential equation.

$y(x) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

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6. Question Details ZillDiffEQ9 2.3.012. [3876510]

Find the general solution of the given differential equation.

$$(1 + x)\frac{dy}{dx} - xy = x + x^2$$

$y(x) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

7. Question Details ZillDiffEQ9 2.3.013. [3876557]

Find the general solution of the given differential equation.

$$x^2y' + x(x + 2)y = e^x$$

$y(x) =$

Give the largest interval over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

8. Question Details ZillDiffEQ9 2.3.015.EP. [4903597]

Consider the following differential equation.

$$y\,dx - 3(x + y^5)\,dy = 0$$

Find the coefficient function $P(y)$ when the given differential equation is written in the standard form $\frac{dx}{dy} + P(y)\,x = f(y)$.

$P(y) =$

Find the integrating factor for the differential equation.

$e^{\int P(y)\,dy} =$

Find the general solution of the given differential equation.

$x(y) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It Watch It

9. Question Details ZillDiffEQ9 2.3.017.EP. [4903600]

Consider the following differential equation.

$$\cos(x)\frac{dy}{dx} + (\sin(x))y = 1$$

Find the coefficient function $P(x)$ when the given differential equation is written in the standard form $\frac{dy}{dx} + P(x)y = f(x)$.

$P(x) =$

Find the integrating factor for the differential equation.

$e^{\int P(x)\,dx} =$

Find the general solution of the given differential equation.

$y(x) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

- $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
- $(0, \pi)$
- $(-1, 1)$
- $(-\infty, \infty)$
- $\left(0, \frac{\pi}{2}\right)$

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

10. Question Details ZillDiffEQ9 2.3.019.EP. [4903601]

Consider the following differential equation.

$$(x + 1)\frac{dy}{dx} + (x + 2)y = 6xe^{-x}$$

Find the coefficient function $P(x)$ when the given differential equation is written in the standard form $\frac{dy}{dx} + P(x)y = f(x)$.

$P(x) =$

Find the integrating factor for the differential equation.

$e^{\int P(x)\,dx} =$

Find the general solution of the given differential equation.

$y(x) =$

Give the largest interval I over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It Watch It

11. Question Details ZillDiffEQ9 2.3.023. [3876539]

Find the general solution of the given differential equation.

$$x\frac{dy}{dx} + (5x + 1)y = e^{-5x}$$

$y(x) =$

Give the largest interval over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

12. Question Details ZillDiffEQ9 2.3.024.EP. [4603913]

Consider the following differential equation.

$$(x^2 - 9)\frac{dy}{dx} + 6y = (x + 3)^2$$

Find the coefficient function $P(x)$ when the given differential equation is written in the standard form $\frac{dy}{dx} + P(x)y = f(x)$.

$P(x) =$

Find the integrating factor for the differential equation.

$e^{\int P(x)\,dx} =$

Find the general solution of the given differential equation.

$y(x) =$

Give the largest interval over which the general solution is defined. (Think about the implications of any singular points. Enter your answer using interval notation.)

Determine whether there are any transient terms in the general solution. (Enter the transient terms as a comma-separated list; if there are none, enter NONE.)

Need Help? Read It

13. Question Details ZillDiffEQ9 2.3.025.MI. [4568282]

Solve the given initial-value problem.

$$\frac{dy}{dx} = x + 4y, \quad y(0) = 6$$

$y(x) =$

Give the largest interval I over which the solution is defined. (Enter your answer using interval notation.)

$I =$

Need Help? Read It Watch It

14. Question Details ZillDiffEQ9 2.3.027. [3876555]

Solve the given initial-value problem.

$$xy' + y = e^x, \quad y(1) = 6$$

$y(x) =$

Give the largest interval I over which the solution is defined. (Enter your answer using interval notation.)

$I =$

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15. Question Details ZillDiffEQ9 2.3.031. [4568051]

Solve the given initial-value problem.

$$x\frac{dy}{dx} + y = 6x + 1, \quad y(1) = 9$$

$y(x) =$

Give the largest interval I over which the solution is defined. (Enter your answer using interval notation.)

$I =$

Need Help? Read It Watch It

16. Question Details ZillDiffEQ9 4.1.001. [3745215]

The given family of functions is the general solution of the differential equation on the indicated interval. Find a member of the family that is a solution of the initial-value problem.

$$y = c_1e^x + c_2e^{-x}, (-\infty, \infty); \ y'' - y = 0, \ y(0) = 0, \ y'(0) = 3$$

$y =$

Need Help? Read It

17. Question Details ZillDiffEQ9 4.1.002. [4568033]

The given family of functions is the general solution of the differential equation on the indicated interval. Find a member of the family that is a solution of the initial-value problem.

$$y = c_1e^{4x} + c_2e^{-x}, (-\infty, \infty); \ y'' - 3y' - 4y = 0, \ y(0) = 1, \ y'(0) = 1$$

$y =$

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18. Question Details ZillDiffEQ9 4.1.004. [4568079]

The given family of functions is the general solution of the differential equation on the indicated interval. Find a member of the family that is a solution of the initial-value problem.

$y = c_1 + c_2 \cos(x) + c_3 \sin(x), (-\infty, \infty);$
$y''' + y' = 0, \quad y(\pi) = 0, \quad y'(\pi) = 3, \quad y''(\pi) = -1$

$y =$

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19. Question Details ZillDiffEQ9 4.1.009. [3745294]

Find the largest interval which includes $x = 0$ for which the given initial-value problem has a unique solution. (Enter your answer using interval notation.)

$(x - 3)y'' + 5y = x, y(0) = 0, y'(0) = 1$

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20. Question Details ZillDiffEQ9 4.1.017.EP. [4603959]

Consider the following functions.

$f_1(x) = 6, \quad f_2(x) = \cos^2(x), \quad f_3(x) = \sin^2(x)$
$g(x) = c_1 f_1(x) + c_2 f_2(x) + c_3 f_3(x)$

Solve for c_1, c_2, and c_3 so that $g(x) = 0$ on the interval $(-\infty, \infty)$. If a nontrivial solution exists, state it. (If only the trivial solution exists, enter the trivial solution $\{0, 0, 0\}$.)

$\{c_1, c_2, c_3\} = \{ \quad \}$

Determine whether f_1, f_2, f_3 are linearly independent on the interval $(-\infty, \infty)$.

- linearly dependent
- linearly independent

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21. Question Details ZillDiffEQ9 4.1.021.EP. [4603961]

Consider the following functions.

$$f_1(x) = 3 + x, \quad f_2(x) = x, \quad f_3(x) = x^2$$
$$g(x) = c_1f_1(x) + c_2f_2(x) + c_3f_3(x)$$

Solve for c_1, c_2, and c_3 so that $g(x) = 0$ on the interval $(-\infty, \infty)$. If a nontrivial solution exists, state it. (If only the trivial solution exists, enter the trivial solution $\{0, 0, 0\}$.)

$\{c_1, c_2, c_3\} =$ { }

Determine whether f_1, f_2, f_3 are linearly independent on the interval $(-\infty, \infty)$.

- linearly dependent
- linearly independent

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22. Question Details ZillDiffEQ9 4.1.022. [3894055]

Determine whether the given set of functions is linearly independent on the interval $(-\infty, \infty)$.

$$f_1(x) = e^x, \quad f_2(x) = e^{-x}, \quad f_3(x) = \sinh(x)$$

- linearly dependent
- linearly independent

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23. Question Details ZillDiffEQ9 4.1.022.EP. [4603980]

Consider the following functions.

$$f_1(x) = e^x, \quad f_2(x) = e^{-x}, \quad f_3(x) = \sinh(x)$$
$$g(x) = c_1f_1(x) + c_2f_2(x) + c_3f_3(x)$$

Solve for c_1, c_2, and c_3 so that $g(x) = 0$ on the interval $(-\infty, \infty)$. If a nontrivial solution exists, state it. (If only the trivial solution exists, enter the trivial solution $\{0, 0, 0\}$.)

$\{c_1, c_2, c_3\} =$ { }

Determine whether f_1, f_2, f_3 are linearly independent on the interval $(-\infty, \infty)$.

- linearly dependent
- linearly independent

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24. Question Details ZillDiffEQ9 4.1.023. [3894119]

Consider the differential equation

$y'' - y' - 6y = 0.$

Verify that the functions e^{-2x} and e^{3x} form a fundamental set of solutions of the differential equation on the interval $(-\infty, \infty)$.

The functions satisfy the differential equation and are linearly independent since the Wronskian

$W\left(e^{-2x}, e^{3x}\right) =$ [ ] $\neq 0$ for $-\infty < x < \infty$.

Form the general solution.

$y =$ [ ]

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25. Question Details ZillDiffEQ9 4.1.025. [4568312]

Consider the differential equation

$y'' - 2y' + 37y = 0; \quad e^x \cos(6x), e^x \sin(6x), (-\infty, \infty).$

Verify that the given functions form a fundamental set of solutions of the differential equation on the indicated interval.

The functions satisfy the differential equation and are linearly independent since

$W(e^x \cos(6x), e^x \sin(6x)) =$ [ ] $\neq 0$ for $-\infty < x < \infty$.

Form the general solution.

$y =$ [ ]

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26. Question Details ZillDiffEQ9 4.1.027.MI.SA. [4605488]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Consider the differential equation

$x^2y'' - 4xy' + 6y = 0; \quad x^2, x^3, (0, \infty).$

Verify that the given functions form a fundamental set of solutions of the differential equation on the indicated interval.

Form the general solution.

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Assignment Details

Name (AID): **Math 2C03 2021 Practice problem set #3 (18430419)**
Submissions Allowed: **20**
Category: **Homework**

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