Math 2C03 2021 Assignment #3 (18451606)

Question 1 2 3 4 5 6 7 8 9 10

1. Question Details ZillDiffEQ9 2.3.028.EP. [4603934]

Consider the following differential equations.

$$y\frac{dx}{dy} - x = 6y^2, \quad x(9) = 1$$

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.

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

Solve the given initial-value problem.

$x(y) =$

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

$I =$

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2. Question Details ZillDiffEQ9 2.3.029. [3876533]

Solve the given initial-value problem.

$$L\frac{di}{dt} + Ri = E, \quad i(0) = i_0, \quad L, R, E, i_0 \text{ constants}$$

$i(t) =$

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

$I =$

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3. Question Details ZillDiffEQ9 2.3.034. [3876514]

Solve the given initial-value problem.

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

$y(x) =$

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

$I =$

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4. Question Details ZillDiffEQ9 2.3.052. [3744668]

Reread the discussion following Example 5 in Section 2.3. Construct a linear first-order differential equation for which all solutions are asymptotic to the line $y = 5x - 8$ as $x \to \infty$.

- $y' + y = -5x + 8$
- $y' + y = 5x - 8$
- $y' + y = 8x - 3$
- $y' + y = 5x/8$
- $y' + y = 5x - 3$

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5. Question Details ZillDiffEQ9 2.3.501.XP. [3876614]

Consider the initial-value problem $y' + e^x y = f(x)$, $y(0) = 1$. Express the solution of the IVP for $x > 0$ as a nonelementary integral when $f(x) = 1$.

$y = e^{-e^x}\left(\int_0^x \left(\quad \right) dt + \quad \right)$

What is the solution when $f(x) = 0$?

$y =$

What is the solution when $f(x) = e^x$?

$y =$

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6. Question Details ZillDiffEQ9 4.1.010. [3894050]

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

$$y'' + (\tan(x))y = e^x, \quad y(0) = 1, \quad y'(0) = 0$$

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7. Question Details ZillDiffEQ9 4.1.016. [3894069]

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

$$f_1(x) = 0, \quad f_2(x) = x, \quad f_3(x) = e^x$$

- linearly dependent
- linearly independent

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8. Question Details ZillDiffEQ9 4.1.018. [3876439]

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

$$f_1(x) = \cos(2x), \quad f_2(x) = 1, \quad f_3(x) = \cos^2(x)$$

- linearly dependent
- linearly independent

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9. Question Details ZillDiffEQ9 4.1.026. [3876436]

Consider the differential equation

$$4y'' - 4y' + y = 0; \; e^{x/2}, \; xe^{x/2}.$$

Verify that the functions $e^{x/2}$ and $xe^{x/2}$ 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

$W(e^{x/2}, xe^{x/2}) =$ ____ $\neq 0$ for $-\infty < x < \infty$.

Form the general solution.

$y =$ ____

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10. Question Details ZillDiffEQ9 4.1.028. [3894068]

Consider the differential equation

$$x^2y'' + xy' + y = 0; \quad \cos(\ln(x)), \sin(\ln(x)), (0, \infty).$$

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

$W(\cos(\ln(x)), \sin(\ln(x))) =$ [ ] $\neq 0$ for $0 < x < \infty$.

Form the general solution.

$y =$ [ ]

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Assignment Details

Name (AID): **Math 2C03 2021 Assignment #3 (18451606)**
Submissions Allowed: **5**
Category: **Homework**
Code:
Locked: **Yes**
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