Matthew Mendoza **Math-45-Krauel-F20**

Assignment Math45-Module-03-Exercises due 09/17/2020 at 11:59pm PDT

We have $y = Cx^2$ is a 1-parameter family of solutions for the differential equation $y'x - 2y = 0$. Which of the following is a solution for the initial value problem consisting of the differential equation $y'x - 2y = 0$ and initial condition $y(2) = 12$.

$12 = y(2) = C(2)^2$

$\rightarrow 12 = C(4)$

$\therefore C = 3$

- A. $y = 12x^2$
- B. $y = 3x^2$
- C. $y = Cx^2$
- D. $y = 2x^2$

Answer(s) submitted:

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(incorrect)

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2. (1 point) Consider the initial value problem

$$2ty' = 4y, \quad y(-2) = 4.$$

The general Solution is $y = 1t^2$

Find the value of the constant C and the exponent r so that $y = Ct^r$ is the solution of this initial value problem.

$y =$ $16t^{-2}$ help (formulas)

Answer(s) submitted:

Take $y = Ct^r$ than $y' = rCt^{r-1}$ The subsitute y, y' yields

$2trCt^{r-1} - 4Ct^r = 0$

$\rightarrow 2rCt^{r+1-1} - 4Ct^r = 0$

$\rightarrow 2rCt^r - 4Ct^r = 0$

$\rightarrow Ct^r(2r - 4) = 0$

$2r - 4 = 0 \rightarrow r = 2$

thus the solution is $y = Ct^r$

$\rightarrow y = Ct^2$

Apply initial condition

$4 = C(-2)^2$

$C = 1$

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3. (1 point) Suppose $y' = f(x, y) = \dfrac{xy}{\cos(x)}$.

$\dfrac{\partial f}{\partial y} = \dfrac{\partial}{\partial y} = \dfrac{xy}{\cos(x)}$

(1) $\dfrac{\partial f}{\partial y} =$ $\dfrac{x}{\cos(x)}$ help (formulas)

$\rightarrow \dfrac{x}{\cos(x)} \dfrac{\partial}{\partial x} y$

$\rightarrow \dfrac{x}{\cos(x)} \cdot 1$

$\therefore \dfrac{\partial f}{\partial y} = \dfrac{x}{\cos(x)}$

(2) Since the function $f(x, y)$ is

- Choose
- continuous
- not continuous

at the point $(0, 0)$, the partial derivative $\frac{\partial f}{\partial y}$

- Choose
- exists
- does not exist

2) and is

- Choose
- continuous
- not continuous

at and near the point $(0, 0)$, the solution to $y' = f(x, y)$

- Choose
- exists and is unique
- does not exist

near $y(0) = 0$

Answer(s) submitted:

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(incorrect)

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4. (1 point) For the differential equations $\frac{dy}{dx} = \sqrt{y^2 - 16}$ does the existence/uniqueness theorem guarantee that there is a solution to this equation through the point

$\frac{dy}{dx} = \sqrt{y^2 - 16}$ ← Domain $(-\infty, -4) \cup (4, \infty)$

By existence & Uniqueness theorem

$f(x, y) = \sqrt{y^2 - 16}$

$\frac{\partial f}{\partial y} = \frac{1}{2\sqrt{y^2-16}} \cdot 2y$

$= \frac{1}{\cancel{2}\sqrt{y^2-16}} \cdot \cancel{2}y$

$= \frac{y}{\sqrt{y^2-16}}$

$\frac{y}{\sqrt{y^2-16}}$

False ? 1. $(-1, 4)$? X - Can't divide by zero

True ? 2. $(-4, 19)$? 1.022...

True ? 3. $(1, 25)$? 1.022...

False ? 4. $(3, -4)$? X - Can't divide by zero

Note: To answer this question, compute the partial derivative of $f(x, y) = \sqrt{y^2 - 16}$ with respect to y and check if $f(x, y)$ and $\frac{\partial f}{\partial y}$ exists at the given points. If they do, then the conditions of the theorem are satisfied at the given points.

Answer(s) submitted:

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(incorrect)

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5. (1 point)

Enter a value for π

π

Answer(s) submitted:

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(incorrect)