Chapter 8 - Numerical Solution of ODEs - Spring 2021 - Part 1

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1

In the differential equation below, the variable x is the _____ variable.

$\frac{dy}{dx} + 3y = e^{-x},\ y(0) = 6$

- ◯ independent
- ◯ dependent

2

What is the form of the exact solution to the differential equation below?

$2\frac{dy}{dx} + 3y = e^{-x},\ y(0) = 5$

- ◯ $Ae^{-1.5x} + Be^{-x}$
- ◯ $Ae^{-1.5x} + Bxe^{-x}$
- ◯ $Ae^{1.5x} + Be^{-x}$
- ◯ $Ae^{1.5x} + Bxe^{-x}$

3

The velocity of a body is given below. Then the distance covered by the body from t=0 to t=10 can be calculated by solving which differential equation for x(10).

$v(t) = e^{2t} + 5, t \geq 0$

- ◯ $\frac{dx}{dt} = e^{2t} + 5,\ x(0) = 0$
- ◯ $\frac{dx}{dt} = e^{2t} + 5,\ x(0) = 5$
- ◯ $\frac{dx}{dt} = 2e^{2t},\ x(0) = 0$
- ◯ $\frac{dx}{dt} = \frac{e^{2t}}{2} + 5t,\ x(0) = 0$

4

Give your answer as 4 significant digits. Use chopping for the last digit.

Given $2\frac{dy}{dx} + 3\sqrt{y} = 5x, y(0) = 7$. The problem is solved using Euler's method with a step size of $h = 1.5$ The solution is given in the table below till $x = 4.5$.

x	1.5	3	4.5
y	1.0471	4.3697	10.9164

What is the best estimate for $\frac{dy}{dx}(3)$ based on the above given information?

Enter your math answer

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