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NPTEL

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Courses » Ordinary and Partial Differential Equations and Applications

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Unit 2 - Week 1

Assignment 01

The due date for submitting this assignment has passed. **Due on 2018-08-15, 23:59 IST.**
As per our records you have not submitted this assignment.

1) *The order of the differential equation* $30\frac{d^2y}{dt^2} + 2\left(1 - \left(\frac{dy}{dt}\right)^3\right)^{1/2} = 0$ *is* **1 point**

- 2
- 3
- 4
- *None of these.*

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

2) *Consider the following differential equations* **1 point**
(1) $y'' + |t|y' + t^2y = 0$,
(2) $y'' + t|y'| + t^2y = 0$. *Then*

- *Both* (1) *and* (2) *are linear differential equations.*
- *Only* (1) *is linear.*
- *Only* (2) *is linear.*
- *Both are non linear.*

No, the answer is incorrect.

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- $1+2t^3$
- $2-t^3$
- $1-t^3$
- $1-2t^3$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$1-2t^3$

4) *The solution of boundary value problem* **1 point**

$y'' - y = 0,\ \ 0 \le t \le \pi;\ y(0) = 0,\ y(\pi) = a, a \neq 0;$ *is given by*

- $a\left(\frac{e^t - e^{-t}}{e^{\pi} - e^{-\pi}}\right)$
- $a\left(\frac{e^t - e^{-t}}{e^{-\pi} - e^{\pi}}\right)$
- $a\left(\frac{e^t + e^{-t}}{e^{\pi} + e^{-\pi}}\right)$
- $a\left(\frac{e^t - e^{-t}}{e^{\pi} + e^{-\pi}}\right)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$a\left(\frac{e^t - e^{-t}}{e^{\pi} - e^{-\pi}}\right)$

5) *Consider the differential equations* **1 point**

$y'' - y = 0,\ \ 0 \le t \le \pi \quad (1)$

$y'' + y = 0,\ \ 0 \le t \le \pi \quad (2)$

with common boundary conditions $y(0) = 0, y(\pi) = a, a \neq 0$. *Then*

- *Equation* (1) *has only positive solution.* $(i.e.\ y(t) > 0\ )$
- *Equation* (2) *has only negative solution.* $(i.e.\ y(t) < 0\ )$
- *Equation* (1) *has a unique solution if* $a > 0$.
- *Equation* (2) *has a unique solution if* $a > 0$.

No, the answer is incorrect.
Score: 0

Accepted Answers:

Equation (1) has a unique solution if $a > 0$.

6) *Consider the functions defined in the given domain* **1 point**
$f(t,x) = e^t \sin x,\ |x| \leq 2\pi,\ |t| \leq 1$ *and*
$g(t,x) = \frac{1}{t}\sin x,\ g(0,x) = 0,\ |x| \leq \infty, |t| \leq 1$. *Then*

- *Both f and g satisfies the Lipschitz condition.*
- *Only f satisfies the Lipschitz condition.*
- *Only g satisfies the Lipschitz condition.*
- *Neither f nor g satisfies the Lipschitz condition.*

No, the answer is incorrect.
Score: 0

Accepted Answers:
Only f satisfies the Lipschitz condition.

7) *Consider the differential equation $y' = e^y,\ y(0) = 1,$ and let* **1 point**
$y_{n+1}(t) = y(0) + \int_0^t e^{y_n(s)}ds,$ *where $y_n(t)$ represents*
the n^{th} iteration $(n = 0, 1, 2, \ldots)$. Then

- $y_1(t) = e^t - 1$
- $y_1(t) = e^t$
- $y_2(t) = e^{et}$
- $y_2(t) = \frac{e^{et}+1}{e}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y_2(t) = e^{et}$

8) *Consider the differential equation $y' = t + y^2,\ y(0) = 0$.* **1 point**
Then the solution of the above differential equation exists on
the interval (using Picard iteration scheme)

- $[0, \left(\frac{1}{2}\right)^{1/3}]$
- $[0, \left(\frac{1}{2}\right)^{2/3}]$
- $[0, \frac{1}{2}]$
- *None of these.*

No, the answer is incorrect.
Score: 0

Accepted Answers:

$[0, \left(\frac{1}{2}\right)^{2/3}]$

9) **1 point**

Consider the differential equation $y' = e^{-t^2} + y^2,\ y(1) = 0$. *Then the solution of the above differential equation exists on the interval (using Picard iteration sche*

- $[1, 1 + \sqrt{e}]$
- $[1, 1 + \frac{\sqrt{e}}{2}]$
- $[1, 1 + 2\sqrt{e}]$
- $[1, 2 + \sqrt{e}]$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$[1, 1 + \frac{\sqrt{e}}{2}]$

10) *Consider the differential equations* **1 point**

$y' = y,\ y(0) = 0 \quad (1)$
$y' = \sqrt{y},\ y(0) = 0 \quad (2)$

- *Both* (1) *and* (2) *are well posed problem*
- *Only* (1) *is well posed problem*
- *Only* (2) *is well posed problem*
- *Neither* (1) *nor* (2) *is well posed problem.*

No, the answer is incorrect.
Score: 0

Accepted Answers:
Neither (1) *nor* (2) *is well posed problem.*

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