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WARNING: Team HADI is not responsible for any mistake or wrong answer. All students reading and using this document may check and confirm the answers at their own.



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Best of luck!



Question No : 1 of 26

Marks: 1 (Budgeted Time 1 Min)

Wronskian of the function $y_c = c_1 + c_2 \cos x + c_3 \sin x$ is

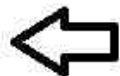
Answer (Please select your correct option)

0

☐

1

☒



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2

☐

3

☐

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Question No : 2 of 26

Marks: 1 (Budgeted Time 1 Min)

The value of amplitude in the solution $X=40\sin(7t+4)$ is

Answer (Please select your correct option)

☐ 7

☐ 4

☒ 40

☐ 20



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Question No : 3 of 26

Marks: 1 (Budgeted Time 1 Min)

The degree of the differential equation $\left[1 - x\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = \frac{d^2y}{dx^2}$ is

Answer (Please select your correct option)

☐ 1

☐ 2



☐ 3

☐ None of these

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Question No : 4 of 26

Marks: 1 (Budgeted Time 1 Min)

Which of the following is the equation of pendulum?

Answer (Please select your correct option)

☐ $\frac{d^2\theta}{dt^2} + \frac{g}{l} \sin \theta = F(t)$



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☐ $\frac{d\theta}{dt} + \frac{g}{l} \sin \theta = F(t)$

☐ $\frac{du}{dt} = F(u)G(t)$

☐ None of these

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Question No : 5 of 26

Marks: 1 (Budgeted Time 1 Min)

The differential equation $(x^2 - 2x + 2y^2) dx + 2xy dy = 0$ is a/an -----differential equation.

Answer (Please select your correct option)

☐ Exact

☒ Non-exact

☐ Homogenous

☐ Separable



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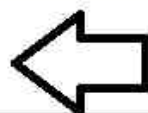
Question No : 6 of 26

Marks: 1 (Budgeted Time 1 Min)

In a Bernoulli equation $\frac{dy}{dx} + \frac{1}{x}y = xy^2$, identify $p(x)$, $q(x)$ & n respectively.

Answer (Please select your correct option)

☐ $\frac{1}{x}, x \text{ \& } 2$



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☐ $y, x^2y \text{ \& } 2$

☐ $y, \frac{1}{x} \text{ \& } 2$

☐ $\frac{1}{y}, y \text{ \& } 2$

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Question No : 7 of 26

Marks: 1 (Budgeted Time 1 Min)

If a differential equation is of the form $y f(x, y) dx + x g(x, y) dy = 0$ with $xM - yN \neq 0$, then the Integrating factor is-----.

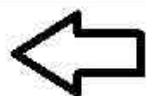
Answer (Please select your correct option)

☐ $\mu = \frac{1}{yN - xM}$

☐ $\mu = \frac{1}{xM + yN}$

☒ $\mu = \frac{1}{xM - yN}$

☐ $\mu = \frac{1}{yM + xN}$



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If the given differential equation is homogeneous and $xM + yN \neq 0$, then the integrating factor of the given differential equation is given by-----.

Answer (Please select your correct option)

☐ $u = \frac{1}{xM + yN}$



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☐ $u = \frac{1}{xM - yN}$

☐ $u = \exp \left[\int \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right) dy \right]$

☐ $u = \exp \left[\int \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right) dx \right]$

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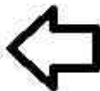
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Question No : 9 of 26

Marks: 1 (Budgeted Time 1 Min)

Number of constant solutions obtained from the separable differential equation $\frac{dy}{dx} = \frac{y^3 - 1}{x}$ is---

Answer (Please select your correct option)

- ☐ 0  correct answer solve by hadi
- ☐ 1
- ☐ 2
- ☐ 3

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Question No : 10 of 26

Marks: 1 (Budgeted Time 1 Min)

If $\frac{dy}{dx} = x$, then $y = \dots\dots\dots$

Answer (Please select your correct option)

☐ $y = \frac{x^2}{2} + c$



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☐ $y = x^2 + c$

☐ $y = x + c$

☐ $y = \frac{x}{2} + c$

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Question No : 11 of 26

Marks: 1 (Budgeted Time 1 Min)

To convert the non-homogenous differential equation $\frac{dy}{dx} = \frac{2x+3y-4}{4x+6y+9}$ into variable separable form, we use the substitution -----.

Answer (Please select your correct option)

☐ $Z = x + y$

☐ $Z = 4x + 3y$

☐ $Z = 2x + 6y$

☒ $Z = 2x + 3y$



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Question No : 12 of 26

Marks: 1 (Budgeted Time 1 Min)

In exponential model for the population growth $P(t) = P_0 e^{kt}$ If $k < 0$, then $\lim_{t \rightarrow \infty} P(t) = \dots$

Answer (Please select your correct option)

☐ ∞

☐

☒ 0

☐

☐ $-\infty$

☐

☐ 1

☐



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infinte

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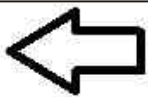
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Question No : 13 of 26

Marks: 1 (Budgeted Time 1 Min)

In exponential model for the population growth $P(t) = P_0 e^{kt}$ If $k > 0$, then $\lim_{t \rightarrow \infty} P(t) = \dots$

Answer (Please select your correct option)

- ☐ ∞  correct answer solve by hadi
- ☐ $-\infty$
- ☐ 0
- ☐ 1

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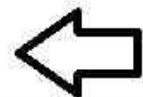
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The constant solutions of the logistic equation $\frac{dP}{dt} = P(a - bP)$ are-----

Answer (Please select your correct option)

☐ P=0, P= b/a

☐ P=0, P=a/b



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☐ P=a/b, P=b/a

☐ P=0, P=0

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Question No : 15 of 26

Marks: 1 (Budgeted Time 1 Min)

If $f(x)$ and $g(x)$ are linearly dependent on I , then-----

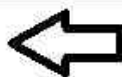
Answer (Please select your correct option)

☐ $W(f,g)(x) \neq 0$ (Wronskian) for all x in the interval I .

☒ $W(f,g)(x) = 0$ (Wronskian) for all x in the interval I .

☐ $W(f,g)(x)$ may or may not be zero for all x in the interval I .

☐ $W(f,g)(x)$ is not defined for all x in the interval I .



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Question No : 16 of 26

Marks: 1 (Budgeted Time 1 Min)

What is annihilator operator of the function $g(x) = \sin x$?

Answer (Please select your correct option)

☐ $(D^3 + 1)$

☐ D^2

☐ $D^2 - 1$

☒ $D^2 + 1$



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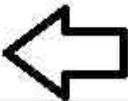
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Question No : 17 of 26

Marks: 1 (Budgeted Time 1 Min)

Which of the following is the annihilator operator of the function $g(x) = 4x - 5$?

Answer (Please select your correct option)

- ☐ D^2 
- ☐ $(D+4)$
- ☐ (D^3-4)
- ☐ $(D-4)$

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Question No : 18 of 26

Marks: 1 (Budgeted Time 1 Min)

The differential equation of the orthogonal trajectory to the family of curves $y = cx$ is-----.

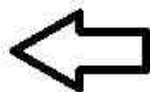
Answer (Please select your correct option)

☐ $\frac{dy}{dx} = -\frac{x}{y}$

☐ $\frac{dy}{dx} = \frac{x}{y}$

☐ $\frac{dy}{dx} = -\frac{y}{x}$

☐ $\frac{dy}{dx} = \frac{y}{x}$



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Question No : 19 of 26

Marks: 1 (Budgeted Time 1 Min)

If $y = 1 + 6x^2 - 7x^3$, then which of the following is true for it ?

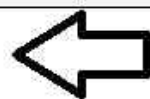
Answer (Please select your correct option)

☐ Its annihilator operator is D .

☐ Its annihilator operator is D^2 .

☐ Its annihilator operator is D^3 .

☐ Its annihilator operator is D^4 .



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If $y_1 = x^2$ and $y_2 = x$ are the first and second solution of $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$, then which of the following is the most accurate option?

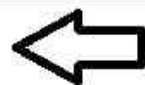
Answer (Please select your correct option)

☐ $W(y_1, y_2)$ must be equal to zero on the indicated interval.

☐ $W(y_1, y_2)$ must be equal to non-zero on the indicated interval.

☐ $W(y_1, y_2)$ may or may not be equal to zero on the indicated interval.

☐ $W(y_1, y_2)$ may or may not be equal to non-zero on the indicated interval.



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Answer (Please [click here](#) to Add Answer)



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Answer (Please [click here](#) to Add Answer)



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Answer (Please [click here](#) to Add Answer)



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Question No : 24 of 26

Marks: 3 (Budgeted Time 6 Min)

Write the solution $x(t) = c_1 \cos \omega t + c_2 \sin \omega t$ of a simple harmonic motion in a simple alternative form?

Answer (Please [click here](#) to Add Answer)



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Question No : 25 of 26

Marks: 5 (Budgeted Time 10 Min)

Find the general solution of the following non-homogenous differential equation using annihilator operator

$$y'' - 3y' + 2y = 4x^2 + 5?$$

Answer (Please [click here](#) to Add Answer)



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Given that $y = c_1 e^x + c_2 e^{-x}$ is a two parameter family of solutions of the differential equation $\frac{d^2 y}{dx^2} - y = 0$ on $(-\infty, \infty)$ find a member of the family satisfying the boundary conditions $y(0) = 0, y'(1) = 1$.

Answer (Please [click here](#) to Add Answer)



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