



MATHS

BOOKS - PUNEET DOGRA

DIFFERENTIAL EQUATION

Practice Sheet

1. The solution of differential equation $xy - ydx = 0$ represents

- A. Rectangular hyperbola
- B. Straight line passing through $(0,0)$
- C. Parabola with vertex at $(0,0)$
- D. Circle with centre at $(0,0)$

Answer: B



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2. Which one of the following differential equations represents the system of circles touching y-axis at the origin ?

A. $\frac{dy}{dx} = x^2 - y^2$

B. $2xy \frac{dy}{dx} = y^2 - x^2$

C. $2xy \frac{dy}{dx} = x^2 - y^2$

D. $\frac{dy}{dx} = y^2 - x^2$

Answer: B



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3. What is the solution of the differential

equation $\frac{dy}{dx} = \frac{y}{(x + 2y^3)}$?

A. $y(1 - xy) = cx$

B. $y^3 - x = cy$

C. $x(1 - xy) = cy$

D. $x(1 + xy) = cy$

Answer: B



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4. If $y^2 = p(x)$ is a polynomial of degree 3 ,

then what is $2 \frac{d}{dx} \left[y^3 \frac{d^2 y}{dx^2} \right]$ equal to

A. $p'(x) p'''(x)$

B. $p''(x) p'''(x)$

C. $p(x) p''(x)$

D. A constant

Answer: C



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5. What is the degree of the equation

$$\left[\frac{d^2 y}{dx^2} \right] = \left[y + \left(\frac{dy}{dx} \right)^2 \right]^{\frac{1}{4}}$$

A. 1

B. 2

C. 3

D. 4

Answer: D



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6. What are the order and degree respectively of the differential equation $y = x \frac{dx}{dy} + \frac{dx}{dy}$?

A. 1, 1

B. 1,2

C. 2,1

D. 2,2

Answer: B



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7. What is the equation of the curve passing through the origin and satisfying the differential equation $dy = (y \tan x + \sec x) dx$?

A. $y = x \cos x$

B. $y \cos x = x$

C. $xy = \cos x$

D. $y \sin = x$

Answer: A



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8. What is the solution of the differential equation $\frac{dy}{dx} = \sec(x + y)$?

A. $y + \tan(x + y) = c$

B. $y - \tan\left\{\frac{x + y}{2}\right\} = c$

C. $y + \tan\left\{\frac{(x + y)}{2}\right\} = c$

D. $y + \tan\left\{\frac{(x + y)}{2}\right\} = c$

Answer: B



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9. For what value of k does the differential equation $\frac{dy}{dx} = ky$ represents the law of natural decay ?

A. -5

B. 0

C. 0.01

D. $(10)^{-1}$

Answer: A



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10. What is the solution of the differential equation $(x + y) (dx - dy) = dx + dy$?

A. A) $x + y + \ln(x + y) = c$

B. B) $x - y + \ln(x + y) = c$

C. C) $y - x + \ln(x + y) = c$

D. D) $y - x - \ln(x - y) = c$

Answer: C



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11. What is the degree of the differential

equation, $k \frac{d^2 y}{dx^2} = \left[1 + \left(\frac{dy}{dx} \right)^3 \right]^{3/2}$, where

k is a constant ?

A. 1

B. 2

C. 3

D. 4

Answer: B



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12. Under which one of the following condition does the solution of $\frac{dy}{dx} = \frac{ax + b}{cy + d}$ represent a parabola ?

A. 1) $a = 0, c = 0$

B. 2) $a = 1, b = 2, c \neq 0$

C. 3) $a = 0, c \neq 0, b \neq 0$

D. 4) $a = 1, c = 1$

Answer: C



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13. A radioactive element disintegrates at a rate proportional to the quantity of substance Q present at any time t . What is the differential equation of the disintegration ?

A. $\frac{dQ}{dt} = -Q$

B. $\frac{dQ}{dt} = -kQ, k < 0$

C. $\frac{dQ}{dt} = -kQ, k > 0$

D. $\frac{dQ}{dt} = Q$

Answer: C



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14. What is the solution of the differential equation $(x + y) (dx - dy) = dx + dy$?

A. $2 \log (x + y) = c (y - x)$

B. $(y - x) + \log (x + y) = c$

C. $\left(\frac{y}{x}\right) + \left[\log\left(\frac{y}{c}\right)\right] = c$

D. None of these

Answer: B



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15. What is the only solution of the initial value problem $y' = t(1 + y)$, $y(0) = 0$?

A. A) $y = -1 + e^{t^2/2}$

B. B) $y = 1 + e^{t^2/2}$

C. C) $y = -t$

D. D) $y = t$

Answer: A



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16. What is the differential equation of the curve $y = ax^2 + bx$?

A. $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$

B. $x^2 \frac{d^2y}{dx^2} - y \left(\frac{dy}{dx} \right)^2 + 2 = 0$

C. $(1 - x)^2 \frac{d^2y}{dx^2} - \left(y \frac{dy}{dx} \right)^2 = 0$

D. None of these

Answer: A



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17. What is the degree of the differential

equation $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2} = k \frac{d^2y}{dx^2}$?

A. 4

B. 3

C. 2

D. 1

Answer: C



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18. If $f(x) = \sqrt{x + \sqrt{x + \sqrt{x + \sqrt{\dots}, \infty}}}$,

then what is $f'(x)$ equal

A. $\frac{1}{1 - 2f(x)}$

B. $\frac{1}{2f(x) - 1}$

C. $\frac{1}{1 + 2f(x)}$

D. $\frac{1}{2 + f(x)}$

Answer: B



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19. What is the solution of the differential

equation $\frac{dy}{dx} = xy + x + y + 1$?

A. $y = \frac{x^2}{2} + x + c$

B. $\log(y + 1) = \frac{x^2}{2} + x + c$

C. $y = x^2 + x + c$

D. $\log(y + 1) = x^2 + x + c$

Answer: B



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20. What are the order and degree , respectively of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^{5/6} = \left(\frac{dy}{dx}\right)^{1/3} ?$$

A. 2, 1

B. 2, 5

C. 2, $\frac{5}{6}$

D. 1, $\frac{1}{3}$

Answer: B



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Prev Year Questions

1. What is the degree of differential equation

$$\frac{d^3y}{dx^3} + \left(\frac{dy}{dx}\right)^2 - x^2 \frac{d^2y}{dx^2} = 0$$

A. 1

B. 2

C. 3

D. 4

Answer: C



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2. The differential equation which represents the family of curves given by $\tan y = c(1 - e^x)$ is

A. $e^x \tan y dx + (1 - e^x) dy = 0$

B. $e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$

C. $e^x(1 - e^x) dx + \tan y dy = 0$

D. $e^x \tan y dy + (1 - e^x) dx = 0$

Answer: B



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3. What is the general solution of the differential equation $\frac{dy}{dx} + \frac{x}{y} = 0$?

A. $x^2 + y^2 = c$

B. $x^2 - y^2 = c$

C. $x^2 + y^2 = cxy$

D. $x + y = c$

Answer: A

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4. Consider the following in respect of the differential equation

$$\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right) + 9y = x$$

1. degree of the differential equation is 1

2. order of the differential equation is 2

Which of the above statement is/are correct ?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C



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5. The differential equation of the system of circles touching the y axis at origin is

A. $x^2 + y^2 - 2xy \frac{dy}{dx} = 0$

B. $x^2 + y^2 + 2xy \frac{dy}{dx} = 0$

C. $x^2 - y^2 + 2xy \frac{dy}{dx} = 0$

D. $x^2 - y^2 - 2xy \frac{dy}{dx} = 0$

Answer: C



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6. If $y = a \cos 2x + b \sin 2x$, then

A. $\frac{d^2y}{dx^2} + y = 0$

B. $\frac{d^2y}{dx^2} + 2y = 0$

C. $\frac{d^2y}{dx^2} - 4y = 0$

D. $\frac{d^2y}{dx^2} + 4y = 0$

Answer: D



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7. What is the solution of the differential equation $\frac{dy}{dx} = \cos(y - x) + 1$?

A. $e^x [\sec(y - x) - \tan(y - x)] = c$

B. $e^x [\sec(y - x) + \tan(y - x)] = c$

C. $e^x \sec(y - x) \tan(y - x) = c$

D. $e^x = \sec(y - x) \tan(y - x)$

Answer: A



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8. What is the solution of the differential

equation $\frac{dx}{dy} = \frac{x + y + 1}{x + y - 1}$?

A. $y - x + 4 \ln (x + y) = c$

B. $y + x + c \ln (x + y) = c$

C. $y - x + \ln (x + y) = c$

D. $y + x + 2 \ln (x + y) = c$

Answer: C



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9. If $y = \sin (\ln x)$, then which one of the following is correct ?

A. $\frac{d^2y}{dx^2} + y = 0$

B. $\frac{d^2y}{dx^2} = 0$

C. $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$

D. $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$

Answer: C



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10. What is the solution of the differential equation $\log \left(\frac{dy}{dx} \right) = ax + by$?

A. $ae^{ax} + be^{by} = c$

B. $\frac{1}{a}e^{ax} + \frac{1}{b}e^{by} = c$

C. $ae^{ax} + be^{-by} = c$

D. $\frac{1}{a}e^{ax} + \frac{1}{b}e^{-by} = c$

Answer: D



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11. What is the order of the differential equation whose solution is $y = a \cos x + b \sin x + ce^{-x} + d$, where a, b, c and d are arbitrary constants ?

A. 1

B. 2

C. 3

D. 4

Answer: D



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12. The equation of the curve passing through the point $(-1, -2)$ which satisfies

$$\frac{dy}{dx} = -x^2 - \frac{1}{x^3} \text{ is}$$

A. $17x^2y - 6x^2 + 3x^5 - 2 = 0$

B. $6x^2y + 17x^2 + 2x^5 - 3 = 0$

$$\text{C. } 6xy - 2x^2 + 17x^5 + 3 = 0$$

$$\text{D. } 17x^2y + 6xy - 3x^5 + 5 = 0$$

Answer: B



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13. The differential equation of the family of curves $y = p \cos (ax) + q \sin (ax)$, where p , q are arbitrary constants , is :

$$\text{A. } \frac{d^2y}{dx^2} - a^2y = 0$$

B. $\frac{d^2y}{dx^2} - ay = 0$

C. $\frac{d^2y}{dx^2} + ay = 0$

D. $\frac{d^2y}{dx^2} + a^2y = 0$

Answer: D



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14. What are the order and degree ,
respectively of the differential equation

$$\left(\frac{d^3y}{dx^3}\right)^2 = y^4 + \left(\frac{dy}{dx}\right)^5 ?$$

A. 4,5

B. 2,3

C. 3 , 2

D. 5 , 4

Answer: C



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15. What is the solution of $(1 + 2x) dy - (1 - 2y)$

$dx = 0$?

A. $x - y - 2xy = c$

B. $y - x - 2xy = c$

C. $y + x - 2xy = c$

D. $x + y + 2xy = c$

Answer: A



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16. The order and degree of the differential equation $y^2 = 4a(x - a)$, where a is an arbitrary constant , are respectively

A. 1, 2

B. 2 , 1

C. 2 , 2

D. 1 , 1

Answer: A



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17. Which one of the following differential equations has a periodic solution ?

A. $\frac{d^2x}{dt^2} + \mu x = 0$

B. $\frac{d^2x}{dt^2} - \mu x = 0$

C. $x \frac{dx}{dt} + \mu t = 0$

D. $\frac{dx}{dt} + \mu xt = 0$

Answer: A



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18. What is the solution of the differential equation $x \, dy - y \, dx = 0$?

A. $xy = c$

B. $y = cx$

C. $x + y = c$

D. $x - y = c$

Answer: B



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19. The differential equation of minimum order by eliminating the arbitrary constants A and C

in the equation $y = A [\sin (x + C) + \cos (x + C)]$

is :

A. $y'' + (\sin x + \cos x)y' = 1$

B. $y'' = (\sin x + \cos x)y'$

C. $y'' = (y')^2 \sin x \cos x$

D. $y'' + y = 0$

Answer: D



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20. The order and degree of the differential equation.

$$\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = \rho^2 \left[\frac{d^2y}{dx^2}\right]^2 \text{ are respectively}$$

.

A. 3 and 2

B. 2 and 2

C. 2 and 3

D. 1 and 3

Answer: B

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21. The solution of the differential equation

$$\frac{dy}{dx} = \frac{y\phi'(x) - y^2}{\phi(x)} \text{ is :}$$

A. $y = \frac{x}{\phi(x) + c}$

B. $y = \frac{\phi(x)}{x} + c$

C. $y = \frac{\phi(x) + c}{x}$

D. $y = \frac{\phi(x)}{x + c}$

Answer: D

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22. The general solution of $\frac{dy}{dx} = \frac{ax + h}{by + k}$ represents a circle only when

A. $a = b = 0$

B. $a = -b \neq 0$

C. $a = b \neq 0, h = k$

D. $a = b \neq 0$

Answer: B



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23. What is the solution of the differential equation $\ln \left(\frac{dy}{dx} \right) - a = 0$?

A. $y = xe^a + c$

B. $x = ye^a + c$

C. $y = \ln x + c$

D. $x = \ln y + c$

Answer: A



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24. What are the degree and order respectively

for the differential equation $y =$

$$x \left(\frac{dy}{dx} \right)^2 + \left(\frac{dx}{dy} \right)^2 ?$$

A. 1 , 2

B. 2 , 1

C. 1 , 4

D. 4 , 1

Answer: D



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25. If $x \, dy = y \, (dx + y \, dy)$, $y(1) = 1$ and $y(x) > 0$, then what is $y(-3)$ equal to

A. A. 3

B. B. 2

C. C. 1

D. D. 0

Answer: A



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26. What is the differential equation corresponding to $y^2 - 2ay + x^2 = a^2$ by eliminating a ?

Where $p = \frac{dy}{dx}$

A. $(x^2 - 2y^2)p^2 - 4pxy - x^2 = 0$

B. $(x^2 - 2y^2)p^2 + 4pxy - x^2 = 0$

C. $(x^2 + 2y^2)p^2 - 4pxy - x^2 = 0$

D. $(x^2 + 2y^2)p^2 - 4pxy + x^2 = 0$

Answer: A



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27. What is the general solution of differential equation $y dx - (x + 2y^2) dy = 0$?

A. $x = y^2 + cy$

B. $x = 2cy^2$

C. $x = 2y^2 + cy$

D. None of these

Answer: C



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28. Find the approx value of:- $15.33^2 - 12.94^2$
 $+ 22.06^2 - 35.65 = ?$

A. a. 720

B. b. 505

C. c. 402

D. c. 600

Answer: A



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29. What is the order of the differential

equation $\frac{dx}{dy} + \int y dx = x^3$?

A. A. 1

B. B. 2

C. C. 3

D. D. Cannot be determined

Answer: B



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30. Which one of the following differential equations represents the family of straight lines which are at unit distance from the origin ?

A. $\left(y - x \frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$

B. $\left(y + x \frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$

C. $\left(y - x \frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$

D. $\left(y + x \frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$

Answer: C



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31. What are the order and degree respectively of the differential equation whose solution is $y = cx + c^2 - 3c^{3/2} + 2$, where c is a parameter ?

A. 1 , 2

B. 2 , 2

C. 1 , 3

D. 1 , 4

Answer: D



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32. The degree of the differential equation

$$\frac{dy}{dx} - x = \left(y - x \frac{dy}{dx} \right)^{-4} \text{ is}$$

A. 2

B. 3

C. 4

D. 5

Answer: D

33. The solution of

$$\frac{dy}{dx} = \sqrt{1 - x^2 - y^2 + x^2 y^2} \text{ is}$$

Where c is an arbitrary constant

A. $\sin^{-1} y = \sin^{-1} x + c$

B. $2 \sin^{-1} y = \sqrt{1 - x^2} + \sin^{-1} x + c$

C. $2 \sin^{-1} y = x \sqrt{1 - x^2} + \sin^{-1} x + c$

D. $2 \sin^{-1} y = x \sqrt{1 - x^2} + \cos^{-1} x + c$

Answer: C



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34. The order and degree of the differential equation of parabola having vertex at the origin and focus at $(a, 0)$ where $a > 0$, are respectively .

A. 1, 1

B. 2, 1

C. 1, 2

D. 2, 2

Answer: A



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35. The differential equation of the family of circles passing through the origin and having centres on the x-axis is :

A. $2xy \frac{dy}{dx} = x^2 - y^2$

B. $2xy \frac{dy}{dx} = y^2 - x^2$

C. $2xy \frac{dy}{dx} = x^2 + y^2$

D. $2xy \frac{dy}{dx} + x^2 + y^2 = 0$

Answer: B



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36. Consider the following statements :

I . The general solution of $\frac{dy}{dx} = f(x) + x$ is of the form $y = g(x) + C$, where C is an arbitrary constant .

II . The degree of $\left(\frac{dy}{dx}\right)^2 = f(x)$ is 2 .

Which of the above statements is /are correct ?

A. A. Only I

B. B. Only II

C. C. Both I and II

D. D. Neither I nor II

Answer: B



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37. What is the solution of the differential

equation $\frac{dx}{dy} + \frac{x}{y} - y^2 = 0$?

A. $xy = x^4 + C$

B. $xy = y^4 + C$

C. $4xy = y^4 + C$

D. $3xy = y^3 + C$

Answer: C



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38. What is the solution of the differential equation $\frac{ydx - xdy}{y^2} = 0$?

A. $xy = C$

B. $y = cx$

C. $x + y = C$

D. $x - y = C$

Answer: B



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39. What is the solution of the differential equation $\sin \left(\frac{dy}{dx} \right) - a = 0$?

Where C is an arbitrary constant

A. $y = x \sin^{-1} a + C$

B. $x = y \sin^{-1} a + C$

C. $y = x + x \sin^{-1} a + C$

D. $y = \sin^{-1} a + C$

Answer: A



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40. What is the degree of the differential

equation $\left(\frac{d^3y}{dx^3}\right)^{\frac{3}{2}} = \left(\frac{d^2y}{dx^2}\right)^2$?

A. 1

B. 2

C. 3

D. 4

Answer: C



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41. What is the solution of the equation In

$$\left(\frac{dy}{dx}\right) + x = 0$$

A. $y + e^x = C$

B. $y - e^{-x} = C$

C. $y + e^{-x} = C$

D. $y - e^x = C$

Answer: C



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42. Eliminating the arbitrary constants B and C

in the expression $y = \frac{2}{3C}(Cx - 1)^{\frac{3}{2}} + B$, we

get ,

A. A. $x \left[1 + \left(\frac{dy}{dx} \right)^2 \right] = \frac{d^2y}{dx^2}$

B. B. $2x \left(\frac{dy}{dx} \right) \frac{d^2y}{dx^2} = 1 + \left(\frac{dy}{dx} \right)^2$

C. C. $\left(\frac{dy}{dx} \right) \frac{d^2y}{dx^2} = 1$

D. D. $\left(\frac{dy}{dx} \right)^2 + 1 = \frac{d^2y}{dx^2}$

Answer: B



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43. What is the general solution of the differential equation $xdy - ydx = y^2dx$?

Where C is an arbitrary constant

A. A. $x = Cy$

B. B. $y = C - x$

C. C. $x + xy - Cy = 0$

D. D. None of these

Answer: D



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44. The general solution of the differential equation

$(x^2 + x + 1)dy + (y^2 + y + 1)dx = 0$ is $(x + y + 1) = A(1 + Bx + Cy + Dxy)$, where B, C and D are constants and A is parameter

What is B equal to ?

A. (A) -1

B. (B) 1

C. (C) 2

D. (D) None of these

Answer: A



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45. The general solution of the differential equation

$(x^2 + x + 1)dy + (y^2 + y + 1)dx = 0$ is $(x + y + 1) = A(1 + Bx + Cy + Dxy)$, where B, C and D are constants and A is parameter

What is C equal to ?

A. (A) 1

B. (B) -1

C. (C) 2

D. (D) None of these

Answer: B



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46. The general solution of the differential equation

$(x^2 + x + 1)dy + (y^2 + y + 1)dx = 0$ is $(x + y + 1) = A(1 + Bx + Cy + Dxy)$, where B, C and D

are constants and A is parameter

What is D equal to ?

A. $(A) - 1$

B. $(B) 1$

C. $(C) - 2$

D. (D) None of these

Answer: C



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47. What is the solution of $\frac{dy}{dx} + 2y = 1$ satisfying $y(0) = 0$?

A. $y = \frac{1 - e^{-2x}}{2}$

B. $y = \frac{1 + e^{-2x}}{2}$

C. $y = 1 + e^x$

D. $y = \frac{1 + e^x}{2}$

Answer: A



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48. The solutions of $\frac{dy}{dx} = |x|$ is

A. $y = \frac{x|x|}{2} + C$

B. $y = \frac{|x|}{2} + C$

C. $y = \frac{x^2}{2} + C$

D. $y = \frac{x^3}{2} + C$

Answer: A



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49. What is the number of arbitrary constant in the particular solution of differential equation of third order ?

A. 0

B. 1

C. 2

D. 3

Answer: D



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50. What is the equation of a curve passing through (0,1) and whose differential equation is given by $dy = y \tan x \, dx$?

A. $y = \cos x$

B. $y = \sin x$

C. $y = \sec x$

D. $y = \operatorname{cosec} x$

Answer: C



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51. Consider the following statements in respect of the differential equation

$$\frac{d^2y}{dx^2} + \cos\left(\frac{dy}{dx}\right) = 0$$

I . The degree of the differential equation is not defined .

II . The order of the differential equation is 2

Which of the above statement is/are correct ?

A. Only I

B. Only II

C. Both I and II

D. Neither I nor II

Answer: C



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52. What is the order of the differential

equation $\left(\frac{dy}{dx}\right)^2 + \frac{dy}{dx} - \sin^2 y = 0$?

A. 1

B. 2

C. 3

D. Undefined

Answer: A



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53. $y = 2 \cos x + 3 \sin x$ satisfies which of the following differential equation ?

I. $\frac{d^2y}{dx^2} + y = 0$

II. $\left(\frac{dy}{dx}\right)^2 + \frac{dy}{dx} = 0$

Select the correct answer using the codes given below .

A. Only I

B. Only II

C. Both I and II

D. Neither I nor II

Answer: A



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54. What is the differential equation of all circles whose centres are at the origin is

A. $\frac{dy}{dx} = \frac{y}{x}$

B. $\frac{dy}{dx} = \frac{x}{y}$

C. $\frac{dy}{dx} = -\frac{x}{y}$

D. None of these

Answer: C



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55. The degree and order respectively of the differential equation $\frac{dy}{dx} = \frac{1}{x + y + 1}$ are

A. 1 , 1

B. 1 , 2

C. 2 , 1

D. 2 , 2

Answer: B



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56. The general solution of the differential equation $x \frac{dy}{dx} + y = 0$ is

A. $xy = C$

B. $x = Cy$

C. $x + y = C$

D. $x^2 + y^2 = C$

Answer: A



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57. What is the degree of the differential equation

$$\left(\frac{d^4y}{dx^4}\right)^{\frac{3}{2}} - 5\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 5 = 0 ?$$

A. 5

B. 4

C. 3

D. 2

Answer: B



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58. The differential equation of the curve $y = \sin x$ is :

A. $\frac{d^2y}{dx^2} + y\frac{dy}{dx} + x = 0$

B. $\frac{x^2y}{dx^2} + y = 0$

C. $\frac{d^2y}{dx^2} - y = 0$

D. $\frac{d^2y}{dx^2} + x = 0$

Answer: B



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59. The general solution of the differential equation $\log \left(\frac{dy}{dx} \right) + x = 0$ is

A. $y = e^{-x} + C$

B. $y = -e^{-x} + C$

C. $y = e^x + C$

D. $y = -e^x + C$

Answer: D



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60. What is the degree of the differential

equation $\frac{d^2y}{dx^2} + 2\left(\frac{d^2y}{dx^2}\right)^2 - \frac{dy}{dx} + y = 0$

A. 6

B. 3

C. 2

D. 1

Answer: D



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61. Consider a differential equation of order m and degree n . Which one of the following pairs is not feasible ?

A. $(3, 2)$

B. $(2, 3/2)$

C. $(2, 4)$

D. $(2, 2)$

Answer: B



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62. What is the solution of the differential equation $3e^x \tan y dx + (1 + e^x) \sec^2 y dy = 0$?

A. $\sin y = C(1 - e^x)$

B. $\cos y = C(e^x - 1)$

C. $\tan y = C(e^x - 1)$

D. None of these

Answer: D



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63. The differential equation representing the family of curves $y = a \sin (\lambda x + \alpha)$ is :

A. $\frac{d^2y}{dx^2} + \lambda^2 y = 0$

B. $\frac{d^2y}{dx^2} - \lambda^2 y = 0$

C. $\frac{d^2y}{dx^2} + \lambda y = 0$

D. None of these

Answer: A



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64. For the differential equation

$$\left(\frac{dy}{dx}\right)^2 - x\left(\frac{dy}{dx}\right) + y = 0, \text{ which one of}$$

the following is not its solution ?

A. $y = x - 1$

B. $4y = x^2$

C. $y = x$

D. $y = -x - 1$

Answer: C



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65. What is the general solution of the following differential equation

$$x^2 dy + y^2 dx = 0 ?$$

A. $x + y = C$

B. $xy = C$

C. $C(x + y) = xy$

D. None of these

Answer: C



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66. The differential equation $y \frac{dy}{dx} + x = a$ where a is a constant represents

A. A set of straight lines

B. A set of ellipses

C. A set of circles

D. None of the above

Answer: C



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67. What is the degree of the differential

equation $y = x \frac{dy}{dx} + \left(\frac{dy}{dx} \right)^{-1}$?

A. 1

B. 2

C. -1

D. Degree does not exist

Answer: B



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68. Which one of the differential equation is not linear

A. $\frac{d^2y}{dx^2} + 4y = 0$

B. $x \frac{dy}{dx} + y = x^3$

C. $(x - y)^2 \frac{dy}{dx} = 9$

D. $\cos^2 x \frac{dy}{dx} + y = \tan x$

Answer: A



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69. What is the solution of the differential

equation $\frac{dy}{dx} + \frac{y}{x} = 0$?

A. $xy = c$

B. $x = cy$

C. $y = cx$

D. None of these

Answer: A



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70. What is the equation of the curve passing through the point $(0, \frac{\pi}{3})$ satisfying the differential equation $\sin x \cos y \, dx + \cos x \sin y \, dy = 0$?

A. $\cos x \cos y = \frac{\sqrt{3}}{2}$

B. $\sin x \sin y = \frac{\sqrt{3}}{2}$

C. $\sin x \sin y = \frac{1}{2}$

D. $\cos x \cos y = \frac{1}{2}$

Answer: D



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71. What is the differential equation of all parabolas whose axes are parallel to Y-axis ?

A. $\frac{d^2y}{dx^2} = 0$

B. $\frac{d^2x}{dy^2} = 0$

C. $\frac{d^3x}{dy^3} = 1$

D. $\frac{d^3y}{dx^3} = C$

Answer: A



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72. If the solution of the differential equation

$$\frac{dy}{dx} = \frac{ax + 3}{2y + f}$$
 represents a circle, then what

is the value of a ?

A. 2

B. 1

C. -2

D. -1

Answer: C



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73. What is the degree of the differential

equation $\left(\frac{d^3y}{dx^3}\right)^{\frac{2}{3}} + 4 - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 0$

?

A. 1

B. 2

C. 3

D. 4

Answer: B

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74. The differential equation $y \frac{dy}{dx} + x = a$

where a is a constant represents

A. A set of circles having centre of Y-axis

B. A set of circles having centre on X -axis

C. A set of ellipse

D. A pair of straight lines

Answer: B

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75. Which one of the following is the differential equation of family to circles having centre at the origin ?

A. A) $(x^2 - y^2) \frac{dy}{dx} = 2xy$

B. B) $(x^2 + y^2) \frac{dy}{dx} = 2xy$

C. C) $\frac{dy}{dx} (x^2 + y^2)$

D. D) $x dx + y dy = 0$

Answer: D



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76. What is the differential equation to family of parabola having their vertices at the origin and foci on the X-axis ?

A. $y = 2x y'$

B. $x = 2y y'$

C. $xy = y'$

D. $x = yy'$

Answer: A

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77. What is the general solution of $(1 + e^x)ydy = e^x dx$?

A. $y^2 = \ln [C^2(e^x + 1)^2]$

B. $dy = \ln (e^x + 1)$

C. $y^2 = \ln [C(e^x + 1)]$

D. None of these

Answer: A

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78. What is the degree of the differential

equation $\left(1 + \frac{dy}{dx}\right)^4 = \left(\frac{d^2y}{dx^2}\right)^2$

A. 1

B. 2

C. 4

D. 8

Answer: B



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79. What does the equation $y \frac{dy}{dx} + x = k$ (where k is a constant) represents ?

A. A family of circles whose centre is on Y-axis

B. A family of circles whose centre is on X-axis

C. Touching the X-axis is a family of circles

D. None of the above

Answer: B



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80. What is the degree of the differential

equation $\frac{d^2y}{dx^2} - \sqrt{1 + \left(\frac{dy}{dx}\right)^2} = 0$?

A. 1

B. 2

C. 3

D. 6

Answer: B



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81. What is the solution of the differential equation $3e^x \tan y dx + (1 + e^x) \sec^2 y dy = 0$?

A. $(1 + e^x) \tan y = C$

B. $(1 + e^x)^3 \tan y = C$

C. $(1 + e^x)^2 \tan y = C$

D. $(1 + e^x) \sec^2 y = C$

Answer: B



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82. What is the differential equation for

$$y^2 = 4a(x - a)?$$

A. $yy' - 2xyy' + y^2 = 0$

B. $yy'(yy' + 2x) + y^2 = 0$

C. $yy'(yy' - 2x) + y^2 = 0$

D. $yy' - 2xyy' + y = 0$

Answer: C



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83. What is the solution of the differential

equation $a \left(x \frac{dy}{dx} + 2y \right) = xy \frac{dy}{dx}$?

A. $x^2 = kye^{\frac{y}{a}}$

B. $yx^2 = ke^{\frac{y}{a}}$

C. $y^2x^2 = kye^{\left(\frac{y^2}{a}\right)}$

D. None of these

Answer: D



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84. The growth of a quantity $N(t)$ at any constant t is given by $\frac{dN(t)}{dt} = \alpha N(t)$. Given that $N(t) = ce^{kt}$. c is a constant. What is the value of α ?

A. c

B. k

C. $c + k$

D. $c - k$

Answer: B



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