MATHS

BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

DIFFERENTIAL EQUATIONS

Illustration

1. The degree of the differential equation

$$\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right), \text{ is}$$

A. 1

B. 2

C. 3

D. none of these

Answer: D

2. The degree of the differential equation

$$\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)^2 = x\sin\left(\frac{d^2y}{dx}\right), \text{ is}$$

A. 1

B. 2

C. 3

D. none of these

Answer: D

3. The degree of the differential equation

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

A. 1

B. 2

C. 3

D. none of these

Answer: B

4. The order and degree of the differential equation

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

A. 2,2

B. 2,3

C. 2,1

D. none of these

Answer: A

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5. If $p\ and\ q$ are the order and degree of the differential equation

$$y\frac{dy}{dx} + x^3\frac{d^2y}{dx^2} + xy = \cos x, \ then \ \text{`p q`} \ \text{d. none of these}$$

A. p lt q

B. p = q

C. p gt q

D. none of these

Answer: C

6. Order and degree of the differential equation

$$\frac{d^2y}{dx^2} = \left\{ y + \left(\frac{dy}{dx} \right)^2 \right\}^{1/4} \quad \text{are}$$

A. 4 and 2

B. 1 and 2

C. 1 and 4

D. 2 and 4

Answer: D

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7. The order of the differential equation

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

A. 2

B. 3

C. $1/2$

D. 6

Answer: A

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8. If m and n are order and degree of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^5 + \frac{4\left(\frac{d^2y}{dx^2}\right)^3}{\frac{d^3y}{dx^3}} + \frac{d^3y}{dx^3} = x^2 - 1$$

A. m = 3, n = 3

B. m = 3, n= 2

C. m = 3, n = 5

D. m = 3, n = 1

Answer: B

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9. The solution of the differential equation $\left(\dfrac{dy}{dx}\right)^2 - x\dfrac{dy}{dx} + y = 0$ is

(a) $(b)(c)y = 2(d)$ (e) (b) $(f)(g)y = 2x(h)$ (i) (c) $(d)(e)y = 2x - 4(f)$

(g) (d) $(h)(i)y = 2(j)x^{(k)2(l)}(m) - 4(n)$ (o)

A. y = 2

B. y = 2x

C. y = $2x - 4$

D. $y = 2x^2 - 4$

Answer: C

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10. The solution of the differential equation

$\left(1 + x^2\right)\dfrac{dy}{dx} + 1 + y^2 = 0$, is

A. $\tan^{-1}x - \tan^{-1}y = \tan^{-1}C$

B. $\tan^{-1}y - \tan^{-1}x = \tan^{-1}C$

C. $\tan^{-1} y \pm \tan^{-1} x = \tan C$

D. $\tan^{-1} y + \tan^{-1} x = \tan^{-1} C$

Answer: D

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11. If f (x) and g (x) are two solutions of the differential equation

$$\left(a\frac{d^2 y}{dx^2} + x^2 \frac{dy}{dx} + y = e^x, \right. \text{ then} f(x)\text{-}g(x)` \text{ is the solution of}$$

A. $a^2 \dfrac{d^2 y}{dx^2} + \dfrac{dy}{dx} + y = e^x$

B. $a^2 \dfrac{d^2 y}{dx^2} + y = e^x$

C. $a \dfrac{d^2 y}{dx^2} + y = e^x$

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

Answer: D

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12. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equations?

A. $\dfrac{dy}{dx} - my = 0$

B. $\dfrac{dy}{dx} + xy = 0$

C. $\dfrac{d^2y}{dx^2} + m^2y = 0$

D. $\dfrac{d^2y}{dx^2} - m^2y = 0$

Answer: D

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13. The differential equation that represents all parabolas having their axis of symmetry coincident with the axis of x, is

A. $yy_1^2 + y_2 = 0$

B. $yy_2 + y_1^2 = 0$

C. $y_1^2 + yy_2 = 0$

D. $yy_2 + y_1 = 0$

Answer: B

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14. Find the differential equation of all parabolas whose axis are parallel to the x-axis.

A. 2

B. 3

C. 1

D. none of these

Answer: B

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15. The differential equation of all parabolas whose axis of symmetry is along x-axis is of order

A. 2

B. 3

C. 1

D. none of these

Answer: A

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16. The differential equation of all non-vertical lines in a plane, is

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

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

C. $\dfrac{dy}{dx} = 0$

D. $\dfrac{dx}{dy} = 0$

Answer: A

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17. The differential equation of all non-horizontal lines in a plane is (a)
$(b)(c)(d)\dfrac{(e)(f)d^{(g)2(h)}(i)y}{j}\left((k)d(l)x^{(m)2(n)}(o)\right)(p)(q)(r)$ (s) (b)
$(t)(u)(v)\dfrac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\left((cc)d(dd)y^{(ee)2(ff)}(gg)\right)(hh)(ii)=0(jj$
(kk) (c) $(d)(e)(f)\dfrac{(g)dy}{h}((i)dx)(j)(k)=0(l)$ (m) (d)
$(n)(o)(p)\dfrac{(q)dx}{r}((s)dy)(t)(u)=0(v)$ (w)

A. $\dfrac{d^2y}{dx^2}$

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

C. $\dfrac{dy}{dx}=0$

D. $\dfrac{dx}{dy}=0$

Answer: B

18. The differential equation representing the family of curves $y^2 = 2c(x + \sqrt{c})$, where c is a positive parameter, is of (a) order 1 (b) order 2 (c) degree 3 (d) degree 4

A. order 1 and degree 3

B. order 2 and degree 3

C. order 1 degree 2

D. none of these

Answer: A

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19. The differential equation of all circles passing through the origin and having their centres on the x-axis is (1) $x^2 = y^2 + xy\dfrac{dy}{dx}$ (2) $x^2 = y^2 + 3xy\dfrac{dy}{dx}$ (3) $y^2 = x^2 + 2xy\dfrac{dy}{dx}$ (4) $y^2 = x^2 - 2xy\dfrac{dy}{dx}$

A. $y^2 = x^2 + 2xy\dfrac{dy}{dx}$

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

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

D. $x^2 = y^2 + 3xy\dfrac{dy}{dx}$

Answer: A

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20. Family of curves $y = Ax + A^3$ is represented by the differential

equation of degree

   A. 3

   B. 2

   C. 1

   D. none of these

Answer: A

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21. Form the differential equation of the family of parabolas having vertex at origin and axis along positive y-axis.

    A. $2y_1 - y = 0$

    B. $2y_1 + xy = 0$

    C. $xy_1 - 2y = 0$

    D. $yy_1 - 2x = 0$

Answer: C

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22. Form the differential equation of family of lines concurrent at the origin.

    A. $x \dfrac{dy}{dx} - y = 0$

    B. $x + \dfrac{dy}{dx} = 0$

C. $\dfrac{dy}{dx} = 0$

D. $\dfrac{dy}{dx} = x$

Answer: A

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23. The differential equation for which $y = a\cos x + b\sin x$ is a solution, is

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

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

C. $\dfrac{d^2 y}{dx^2} + (a + b)y = 0$

D. $\dfrac{d^2 y}{dx^2} + (a - b)y = 0$

Answer: A

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24. The differential equaiotn which represents the family of curves $y = C_1 e^{C_2 x}$, where C_1 and C_2 are arbitrary constants, is

A. $y' = y^2$

B. $y'' = y' y$

C. $yy'' = y'$

D. $yy'' = (y')^2$

Answer: D

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25. The differential equation of the family of circles with fixed radius 5 units and centre on the line $y = 2$ is (1) $(x2)y'^2 = 25(y2)^2$ (2) $(y2)y'^2 = 25(y2)^2$ (3) $(y2)2y'^2 = 25(y2)^2$ (4) $(x2)2y'^2 = 25(y2)^2$

A. $(y - 2)^2 y'^2 = 25 - (y - 2)^2$

B. $(x - 2)^2 y'^2 = 25 - (y - 2)^2$

C. $(x - 2)y'^2 = 25 - (y - 2)^2$

D. $(y - 2)y'^2 = 25 - (y - 2)^2$

Answer: A

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26. Form a differential equation for the family of curves represented by $ax^2 + by^2 = 1$, where a and b are arbitrary constants.

    A. second order and second degree

    B. first order and second degree

    C. first order and first degree

    D. second order and first degree

Answer: D

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27. The general solution of the differential equation $xdy + ydx + 2x^3dx = 0$, is

A. $xy + x^4 = C$

B. $xy + \dfrac{1}{2}x^4 = C$

C. $x + y + \dfrac{1}{2}x^4 = 0$

D. $xy - \dfrac{1}{2}x^4 = C$

Answer: B

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28. The solution of differential equation $xdx + ydy = a(x^2 + y^2)dy$,is

A. $x^2 + y^2 = Ce^{ay}$

B. $x^2 + y^2 = Ce^{2ay}$

C. $x^\circ + y^2 = e^{2Cay}$

D. none of these

Answer: B

29. The solution of the differential equation

$(1 + xy)xdy + (1 - xy)ydx = 0$,is

A. $\dfrac{1}{xy} + \log\left(\dfrac{y}{x}\right) = C$

B. $-xy + \log\left(\dfrac{y}{x}\right) = C$

C. $-\dfrac{1}{xy} + \log\left(\dfrac{y}{x}\right) = C$

D. $-\dfrac{1}{xy} + \log\left(\dfrac{x}{y}\right) = C$

Answer: C

30. Solution of the differential equation $\dfrac{xdy}{x^2 + y^2} = \left(\dfrac{y}{x^2 + y^2} - 1\right)dx,$

is

A. $\tan^{-1}\left(\dfrac{y}{x}\right) = -x + C$

B. $\tan^{-1}\left(\dfrac{y}{x}\right) = x + C$

C. $\tan^{-1}\left(\dfrac{x}{y}\right) = -x + C$

D. $\tan^{-1}\left(\dfrac{y}{x}\right) = -y + C$

Answer: A

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31. Solve the differential equation $ye^{\frac{x}{y}}\,dx = \left(xe^{\frac{x}{y}} + y^2\right)dy(y \neq 0)$

A. $e^{x/y} = \cos y + C$

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

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

D. $e^{x/y} = -\cos y + C$

Answer: C

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32. The solution of $\frac{dy}{dx} = \frac{x^2 + y^2 + 1}{2xy}$ satisfying $y(1) = 1$ is given by (a) a system of parabolas (b) a system of circles (c) $(d)(e)(f)y^{(g)2(h)}(i) = x((j)(k)1 + x(l)) - 1(m)$ (n) (d) *[Math Processing Error]* (hh)

A. a hyperbola

B. a circle

C. $y^2 = x(1 + x) - 10$

D. $(x - 2)^2 + (y - 3)^2 = 5$

Answer: A

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33. The solution of the differential equation $x^3 \frac{dy}{dx} + 4x^2 \tan y = e^x \sec y$ satisfying $y(1) = 0$, is

A. $\tan y = (x - 2)e^x \log x$

B. $\sin y = e^x (x - 1)x^{-4}$

C. $\tan y = (x - 1)e^x x^{-3}$

D. $\sin y = e^x (x - 1)x^{-3}$

Answer: B

34. Solution of the differential equation

$$\frac{\sqrt{x}dx + \sqrt{y}dy}{\sqrt{x}dx - \sqrt{y}dy} = \sqrt{\frac{y^3}{x^3}} \text{ is given by}$$

A. $\dfrac{3}{2}\log\left(\dfrac{y}{x}\right) + \log\left|\dfrac{x^{3/2} + y^{3/2}}{x^{3/2}}\right| + \tan^{-1}\left(\dfrac{y}{x}\right)^{3/2} + C = 0$

B. $\dfrac{2}{3}\log\left(\dfrac{y}{x}\right) + \log\left|\dfrac{x^{3/2} + y^{3/2}}{x^{3/2}}\right| + \tan^{-1}.\dfrac{y}{x} + C = 0$

C. $\dfrac{2}{3}\log\left(\dfrac{y}{x}\right) + \log\left(\dfrac{x + y}{x}\right) + \tan^{-1}\left(\dfrac{y^{3/2}}{x^{3/2}}\right) + C = 0$

D. none of these

Answer: D

35. The solution of the differential equation $xdx + ydy + \dfrac{xdy - ydx}{x^2 + y^2} = 0$, is

A. $y = x\tan\left(\dfrac{x^2 + y^2 + C}{2}\right)$

B. $x = y\tan\left(\dfrac{x^2 + y^2 + C}{2}\right)$

C. $y = x\tan\left(\dfrac{C - x^2 - y^2}{2}\right)$

D. none of these

Answer: C

36. The general solution of the differential equation $y(x^2y + e^x)dy = 0$, is

A. $x^3y - 3e^x = Cy$

B. $x^3y + 3e^x = 3Cy$

C. $y^3x - 3e^y = Cx$

D. $y^3x + 3e^y = Cx$

Answer: B

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37. If a curve $y = f(x)$ passes through the point $(1, -1)$ and satisfies the differential equation , $y(1 + xy)dx = xdy$, then $f\left(-\dfrac{1}{2}\right)$ is equal to: (1) $-\dfrac{2}{5}$ (2) $-\dfrac{4}{5}$ (3) $\dfrac{2}{5}$ (4) $\dfrac{4}{5}$

A. $-\dfrac{2}{5}$

B. $-\dfrac{4}{5}$

C. $\dfrac{2}{5}$

D. $\dfrac{4}{5}$

Answer: D

38. The solution of the differential equaiton $\dfrac{ydx + xdy}{ydx - xdy} = \dfrac{x^2 e^{xy}}{y^4}$ satisfying $y(0) = 1$, is

A. $x^3 = 3y^3\left(-1 + e^{-xy}\right)$

B. $x^3 = 3y^3\left(1 - e^{-xy}\right)$

C. $x^3 = 3y^3\left(-1 + e^{xy}\right)$

D. $x^3 = 3y^3\left(1 - e^{xy}\right)$

Answer: B

39. The solution of the differential equation $ydx + \left(x + x^2 y\right)dy = 0$ is

A. $\log y = Cx$

B. $-\dfrac{1}{xy} + \log y = C$

C. $\dfrac{1}{xy} + \log y = C$

D. $-\dfrac{1}{xy} = C$

Answer: B::D

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40. Find the general solution of the differential equation $\dfrac{dy}{dx} + \sqrt{\dfrac{1-y^2}{1-x^2}} = 0.$

A. $\tan^{-1} x + \cot^{-1} x = C$

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

C. $\sec^{-1} x + \csc^{-1} x = C$

D. none of these

Answer: B

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41. Solution of the differential equation $xdy - ydx = 0$ represents

A. a rectangular hyperbola

B. a straight line passing through the origin

C. parabola whose vertex is at the origin

D. circle whose centre is at the origin

Answer: B

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42. The solution of the differential equation

$\sin x \cos y dy + \cos x \sin y dx = 0$ is

A. $\dfrac{\sin x}{\sin y} = C$

B. $\cos x + \cos y = C$

C. $\sin x + \sin y = C$

D. $\sin x \sin y = C$

Answer: D

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43. The solution of the differential equaiton

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

A. $y = \tan^{-1} x$

B. $y - x = C(1 + xy)$

C. $x = \tan^{-1} y$

D. $\tan(xy) = C$

Answer: B

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44. Solution of the differential equation $\dfrac{dx}{x} + \dfrac{dy}{y} = 0$ is

A. $\dfrac{1}{x} + \dfrac{1}{y} = C$

B. $\log x \log y = C$

C. $xy = C$

D. $x + y = C$

Answer: C

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45. The differental equation $y\dfrac{dy}{dx} + x = C$ represents

A. a family of hyperbola

B. a family of circles whose centres are on y-axis

C. a family of circle of parabolas

D. a family of circles whose centres are on x-axis.

Answer: D

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46. If $y = y(x)$ and $\left(\dfrac{2 + \sin x}{y + 1} \right) \dfrac{dy}{dx} = -\cos x,\ y(0) = 1$, then $y\left(\dfrac{\pi}{2} \right)$ equals (A) $\dfrac{1}{3}$ (B) $\dfrac{2}{3}$ (C) $-\dfrac{1}{3}$ (D) 1

A. $\dfrac{1}{3}$

B. $\dfrac{2}{3}$

C. $-\dfrac{1}{3}$

D. 1

Answer: A

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47. The differential equation $\dfrac{dy}{dx} = \dfrac{\sqrt{1 - y^2}}{y}$ determines a family of circle with (a) variable radii and a fixed centre at (0, 1) (b) variable radii and a fixed centre at $(c)(d)((e)(f)0,\ -1(g))(h)$ (i) (j) Fixed radius 1 and variable centres along the x-axis. (k) Fixed radius 1 and variable centres along the y-axis.

A. variable radii and fixed centre at (0, 1)

B. variable radii and a fixed centre at $(0, -1)$

C. fixed radius 1 and variable centre along the x-axis

D. fixed radius 1 and variable centre along the y-axis

Answer: C

48. Interval contained in the domain of definition of non-zero solutions of the differential equation $(x - 3)^2 y' + y = 0$

A. $(-\pi/2, \pi/2)$

B. $(0, \pi)$

C. $(0, 2\pi)$

D. $(-\pi, \pi)$

Answer: A

49. If $(2 + \sin x)\dfrac{dy}{dx} + (y + 1)\cos x = 0$ and $y(0) = 1$, then $y\left(\dfrac{\pi}{2}\right)$ is equal to

A. $\dfrac{1}{3}$

B. $\dfrac{4}{3}$

C. $\dfrac{1}{2}$

D. $-\dfrac{2}{3}$

Answer: A

50. If $y = y(x)$ satisfies the differential equation

$8\sqrt{x}\left(\sqrt{9 + \sqrt{x}}\right)dy = \left(\sqrt{4 + \sqrt{9 + \sqrt{x}}}\right)^{-1}dx, x > 0 \, and \, y(0) = \sqrt{7},$

then $y(256) = $ 16 (b) 80 (c) 3 (d) 9

A. 3

B. 9

C. 16

D. 80

Answer: A

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51. The solution of $\cos(x + y)dy = dx$ is

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

B. $y = \cos^{-1}\left(\dfrac{y}{x}\right)$

C. $y = x\sec\left(\dfrac{y}{x}\right) + C$

D. none of these

Answer: A

52. The solution of the differential equation $\dfrac{dy}{dx} + 1 = e^{x+y}$, is

A. $(x + y)e^{x+y} = 0$

B. $(x + C)e^{x+y} = 0$

C. $(x - C)e^{x+y} = 1$

D. $(x + C)e^{x+y} + 1 = 0$

Answer: D

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53. The equation of a curve passing through the origin and satisfying the differential equation $\dfrac{dy}{dx} = (x - y)^2$, is

A. $e^{2x}(1 - x + y) = 1 + x - y$

B. $e^{2x}(1 + x - y) = 1 - x + y$

C. $e^{2x}(1 - x + y) + (1 + x - y) = 0$

D. $e^{2x}(1 + x + y) = 1 - x + y$

Answer: A

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54. The equation of the curve passing through the origin and satisfying the differential equation $\left(\dfrac{dy}{dx}\right)^2 = (x - y)^2$, is

A. $e^{2x}(1 - x + y) = 1 + x - y$

B. $e^{2x}(1 + x - y) = 1 - x + y$

C. $e^{2x}(1 - x + y) + (1 + x - y)$

D. $e^{2x}(1 + x + y) = 1 - x + y$

Answer: A

55. Solution of the differential equation

$$\left(\frac{x+y-1}{x+y-2}\right)\frac{dy}{dx} = \left(\frac{x+y+1}{x+y+1}\right), \text{ given that } y = 1 \text{ when } x = 1, \text{ is}$$

A. $\log\left|\dfrac{(x-y)^2 - 2}{2}\right| = 2(x+y)$

B. $\log\left|\dfrac{(x-y)^2 + 2}{2}\right| = 2(x-y)$

C. $\log\left|\dfrac{(x-y)^2 + 2}{2}\right| = 2(x-y)$

D. none of these

Answer: D

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56. Which of the following is a homogeneous differential equation ?

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

B. $x\dfrac{dy}{dx} - 2y = x^3$

C. $(x+y-1)dy - (x-y+1)dx = 0$

D. $x \sin\left(\dfrac{y}{x}\right) dy = \left\{ y \sin\left(\dfrac{y}{x}\right) - x \right\} dx$

Answer: D

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57. Find the differential equation of all the circles which pass through the

origin and whose centres lie on y-axis.

    A. a homogeneous differential equation

    B. a differential equation of order 1 and degree 2

    C. a differential equation in variable separable form

    D. a differential equation reducible to variable separable form

Answer: A

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58. By substituting y = vx, the solution of the differential equation

$$\frac{dy}{dx} - \frac{x^2 + y^2}{xy}, \text{ is}$$

A. $x^2 y^2 = \log x + C$

B. $\dfrac{y^2}{2x^2} = \log x + C$

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

D. $\dfrac{y^2}{x^2} = \log x + C$

Answer: B

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59. Solution of the differential equation $x\dfrac{dy}{dx} = y + \sqrt{x^2 + y^2}$, is

A. $x + \sqrt{x^2 + y^2} = Cy^2$

B. $y + \sqrt{x^2 + y^2} = Cy^2$

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

D. $y + \sqrt{x^2 + y^2} = Cx^2$

Answer: D

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60. Which of the following statements on ordinary differential equations is/are true ?

(i) The number of arbitrary constants is same as the degree of the differential equation.

(ii) A linear differential equation can contain products of the dependent variable and its derivatives.

(iii) A particular integral cannot contains arbitrary constants.

(iv) By putting $v = \dfrac{y}{x}$ any homogeneous first order differential equation transforms to variable separable form.

    A. (i) and (iii) only

    B. (ii) and (iii) only

    C. (iii) only

D. (i) and (iv) only

Answer: C

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61. On putting $\dfrac{y}{x} = v$ the differential equation $\dfrac{dy}{dx}\dfrac{2xy - y^2}{2xy - x^2}$ is transfored to

A. $x(2v - 1)dx = 3v(v - 1)dx$

B. $x(2v - 1)dv = 3v(1 - v)dx$

C. $x(1 - 2v)dv = \left(v^2 - 2v\right)dx$

D. $(1 - 2v)dv = \left(v^2 - 2v\right)dx$

Answer: B

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62. The differential equation $\dfrac{dy}{dx} + \dfrac{y^2}{x^2} = \dfrac{y}{x}$ has the solution

A. $x = y(\log x + C)$

B. $y = x(\log y + C)$

C. $x = (y + C)\log x$

D. $y = (x + C)\log y$

Answer: A

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63. The general solution of

$y^2 dx + \left(x^2 - xy + y^2\right) dy = 0$, is

A. $\tan^{-1} . \dfrac{x}{y} + \log y + C = 0$

B. $2\tan^{-1} . \dfrac{x}{y} + \log x + C = 0$

C. $\log\left(y + \sqrt{x^2 + y^2}\right) + \log y + C = 0$

D. $\log y = \tan^{-1} \cdot \dfrac{y}{x} + C$

Answer: D

64. 8 The solution of differential equation $\dfrac{dy}{dx} = \dfrac{y}{x} + \dfrac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

A. $\phi\left(\dfrac{y}{x}\right) = kx$

B. $x\phi\left(\dfrac{y}{x}\right) = k$

C. $\phi\left(\dfrac{y}{x}\right) = ky$

D. $y\phi\left(\dfrac{y}{x}\right) = k$

Answer: A

65. If $x\dfrac{dy}{dx} = y(\log y - \log x + 1)$, then the solution of the equation is

A. $\log\left(\dfrac{x}{y}\right) = Cy$

B. $\log\left(\dfrac{y}{x}\right) = Cx$

C. $x \log\left(\dfrac{y}{x}\right) = Cy$

D. $y \log\left(\dfrac{x}{y}\right) = Cx$

Answer: B

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66. The differential equation

$$\frac{dy}{dx} = \frac{7x - 3y - 7}{-3x + 7y + 3}$$

reduces to homogeneous form by making the substitution

A. $x = X + 1, y = Y + 0$

B. $x = X + 1, y = Y + 1$

C. $x = X - 1, y = Y + 1$

D. $x = X + 0, y = Y + 1$

Answer: A

---

67. The differential equation $\dfrac{dy}{dx} = \dfrac{x + y - 1}{x + y + 1}$

reduces to variable separable form by making the substitution

A. $x + y = v$

B. $x - y = v$

C. $y = vx$

D. $x = vy$

Answer: A

---

68. The substituting $y = vx$ reduces the homogeneous differential

equation $\dfrac{dy}{dx} = \dfrac{y}{x} + \tan. \dfrac{y}{x}$ to the form

A. $(\tan v)dv = xdx$

B. $(\tan v)dv = \dfrac{dx}{x}$

C. $(\cot v)dv = xdx$

D. $\cot vdv = \dfrac{dx}{x}$

Answer: D

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69. A solution curve of the differential equation $\left(x^2 + xy + 4x + 2y + 4\right)\left(\dfrac{dy}{dx}\right) - y^2 = 0$ passes through the point $(1, 3)$ Then the solution curve is

A. intersects $y = x + 2$ exactly at one point

B. intersects $y = x + 2$ exactly at two points

C. intersects $y = (x + 2)^2$

D. does not intersect $y = (x + 3)^2$

Answer: A::D

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70. The integrating factor of the differential equation

$$\left(1 - x^2\right)\frac{dy}{dx} - xy = 1, \text{ is}$$

A. $-x$

B. $\dfrac{x}{1x^2}$

C. $\sqrt{1 - x^2}$

D. $\dfrac{1}{2}\log\left(1 - x^2\right)$

Answer: C

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71. The solution of $\dfrac{dy}{dx} + P(x)y = 0, \text{ is}$

A. $y = Ce^{\int p dx}$

B. $y = Ce^{-\int P dx}$

C. $x = Ce^{-\int P dy}$

D. $x = Ce^{\int P dy}$

Answer: B

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72. The integrating factor of the differential equation

$\dfrac{dy}{dx}\left(x(\log)_e x\right) + y = 2(\log)_e x$ is given by

A. $\log(\log x)$

B. e^x

C. $\log x$

D. x

Answer: C

73. Integrating factor of differential equation $\cos x \dfrac{dy}{dx} + y \sin x = 1$ is

(a) (b) $(c)\cos x (d)$ (e) (b) $(f)(g)\tan x(h)$ (i) (c) $(d)(e)\sec x(f)$ (g) (d)

$(h)(i)\sin x(j)$ (k)

   A. $\sin x$

   B. $\sec x$

   C. $\tan x$

   D. $\cos x$

Answer: B

74. Which of the following transformations reduce the differential equation $\dfrac{dz}{dx} + \dfrac{z}{x}\log z = \dfrac{z}{x^2}(\log z)^2$ into the form $\dfrac{dv}{dx} + P(x)v = Q(x)$

A. $u = \log x$

B. $u = e^z$

C. $u = (\log z)^{-1}$

D. $u = (\log z)^2$

Answer: C

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75. The differential equation $x\dfrac{dy}{dx} - y = x^3,$ has the general solution

A. $y - x^3 = 2Cx$

B. $2y - x^3 = Cx$

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

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

Answer: B

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76. If integrating factor of $x(1 - x^2)dy + (2x^2y - y - ax^3)dx = 0$ is $e^{\int pdx}$, then P is equal to (a)

$(b)(c)(d)\dfrac{(e)2(f)x^{(g)2(h)}(i) - a(j)x^{(k)3(l)}(m)}{n}\left((o)x\left((p)(q)1 - (r)x^{(s)2(}\right.\right.$

(z) (b) *[Math* *Processing* *Error]* (hh) (c)

$(d)(e)(f)\dfrac{(g)2(h)x^{(i)2(j)}(k) - a}{l}\left((m)a(n)x^{(o)3(p)}(q)\right)(r)(s)(t)$ (u)

(d)

$(v)(w)(x)\dfrac{(y)2(z)x^{(aa)2(bb)}(cc) - 1}{dd}\left((ee)x\left((ff)(gg)1 - (hh)x^{(ii)2(jj)}(k\right.\right.$

(pp)

A. $\dfrac{2x^2 - ax^3}{x(1 - x^2)}$

B. $2x^3 - 1)$

C. $\dfrac{2x^2 - 1}{ax^3}$

D. $\dfrac{2x^2 - 1}{x(1 - x^2)}$

Answer: D

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77. The integrating factor of differential equation $\dfrac{dy}{dx} + y = \dfrac{1+y}{x}$ is

A. $\dfrac{x}{e^x}$

B. $\dfrac{e^x}{x}$

C. xe^x

D. e^x

Answer: B

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78. Integrating factor of the differential equation $(x+1)\dfrac{dy}{dx} - y = e^{3x}(x+1)^2$, is

A. $-(x+1)$

B. $\log(x+1)$

C. e^{x+1}

D. $\dfrac{1}{x+1}$

Answer: D

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79. The differential equation

$$\dfrac{dy}{dx} + x\sin 2y = x^3 \cos^2 y$$

when transformed to linear form becomes

A. $\dfrac{dz}{dx} + \dfrac{z}{x^2} = x$

B. $\dfrac{dz}{dx} + zx = \dfrac{x^3}{2}$

C. $\dfrac{dz}{dx} + 2xz = x^3$

D. $\dfrac{dz}{dx} + \dfrac{z}{x} = x^2$

Answer: C

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80. An integrating factor of the differential equation

$$y \log y \frac{dx}{dy} + x - \log y = 0, \text{ is}$$

A. $\log(\log y)$

B. $\log y$

C. $\dfrac{1}{\log y}$

D. $\dfrac{1}{\log(\log y)}$

Answer: B

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81. Consider the differential equation $y\,dx - (x + y^2)\,dy = 0$. If for $y = 1$, x takes value 1, then value of x when y = 4, is

A. 64

B. 9

C. 16

D. 36

Answer: C

82. The function y=f(x) is the solution of the differential equation

$$\frac{dy}{dx} + \frac{xy}{x^2 - 1} = \frac{x^4 + 2x}{\sqrt{1 - x^2}}$$ in (-1, 1), satisfying $f(0) = 0$. Then

$$\int_{-\frac{\sqrt{3}}{2}}^{\frac{\sqrt{3}}{2}} f(x)dx$$ is (A) $\frac{\pi}{3} - \frac{\sqrt{3}}{2}$ (B) $\frac{\pi}{3} - \frac{\sqrt{3}}{4}$ (C) $\frac{\pi}{6} - \frac{\sqrt{3}}{4}$ (D) $\frac{\pi}{6} - \frac{\sqrt{3}}{2}$

A. $\frac{\pi}{3} - \frac{\sqrt{3}}{2}$

B. $\frac{\pi}{3} - \frac{\sqrt{3}}{4}$

C. $\frac{\pi}{6} - \frac{\sqrt{3}}{4}$

D. $\frac{\pi}{6} - \frac{\sqrt{3}}{2}$

Answer: B

83. Let y(x) be the solution of the differential equation

$(x \log x) \dfrac{dy}{dx} + y = 2x \log x, \ (x \geq 1),$ Then y(e) is equal to

A. 2

B. 2e

C. e

D. 0

Answer: A

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84. Let $y(x)$ be a solution of the differential equation

$(1 + e^x)y' + ye^x = 1.$ If $y(0) = 2$, then which of the following statements is (are) true?

A. $y(-4) = 0$

B. $y(-2) = 0$

C. $y(x)$ has critical point in the interval $(-1, 0)$

D. $y(x)$ has no critical point in the interval $(-1, 0)$

Answer: A::C

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85. Let $f : (0, \infty) \to R$ be a differentiable function such that $f'(x) = 2 - \dfrac{f(x)}{x}$ for all $x \in (0, \infty)$ and $f(1) = 1$, then

A. $\lim\limits_{x \to 0^+} f'\left(\dfrac{1}{x}\right) = a$

B. $\lim\limits_{x \to 0^+} xf\left(\dfrac{1}{x}\right) = 2$

C. $\lim\limits_{x \to 0^+} x^2 f'(x) = 0$

D. $|f(x)| \leq 2$ for all $x \in (0, 2)$

Answer: A

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86. Let $f(x)$ be differentiable on the interval $(0, \infty)$ such that $f(1) = 1$ and $\lim\limits_{t \to x} \dfrac{t^2 f(x) - x^2 f(t)}{t - x} = 1$ for each $x > 0$. Then $f(x) =$

A. $\dfrac{1}{3x} + \dfrac{2}{3}x^2$

B. $-\dfrac{1}{3x} + \dfrac{4}{3}x^2$

C. $-\dfrac{1}{x} + \dfrac{2}{x^2}$

D. $\dfrac{1}{x}$

Answer: A

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87. If $f(x)$ is differentiable function in the interval $(0, \infty)$ such that f(1) = 1 and $\lim\limits_{t \to x} \dfrac{t^2 f(x) - x^2 f(t)}{t - x} = 1$ for each $x > 0$, then $f\left(\dfrac{3}{2}\right)$ is equal to

A. $\dfrac{13}{6}$

B. $\dfrac{23}{18}$

C. $\dfrac{25}{9}$

D. $\dfrac{31}{18}$

Answer: D

88. Let f be a real-valued differentiable function on R (the set of all real numbers) such that $f(1) = 1$. If the $y-\in tercept$ of the tangent at any point $P(x, y)$ on the curve $y = f(x)$ is equal to the cube of the abscissa of P, then the value of $f(-3)$ is equal to_____

A. 3

B. 6

C. 9

D. 0

Answer: C

89. Let $y'(x) + y(x)g'(x) = g(x)g'(x), y(0), x \in R,$ where $f'(x)$ denotes $\dfrac{dy(x)}{dx}$, and $g(x)$ is a given non-constant differentiable function on R with $g(0) = g(2) = 0.$ Then the value of $y(2)$ is_____

A. 0

B. 1

C. -1

D. 2

Answer: A

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90. Let the population of rabbits surviving at a time t be governed by the differential equation $\left(dp\dfrac{t}{dt} = \dfrac{1}{2}p(t) - 200.\right.$ If $p(0) = 100$, then p(t) equals (

A. $600 - 500e^{t/2}$

B. $400 - 300e^{-t/2}$

C. $400 - 300e^{t/2}$

D. $300 - 200e^{-t/2}$

Answer: C

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91. The solution of the differential equation $x\dfrac{dy}{dx} + y = x^3 y^6$, is

A. $x^7 = 5y^5 + Cx^2 y^5$

B. $2x^7 = 5y^5 + Cx^2 y^5$

C. $5x^7 = 2y^5 + Cx^2 y^5$

D. $2x^7 = 5y^5 + Cx^5 y^2$

Answer: B

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92. The Bernouli's equation

$$\frac{dy}{dx} - y\tan x = \frac{\sin x \cos^2 x}{y^2}$$ can be transformed to

A. $\dfrac{dz}{dx - y\tan z = \sin z \cos^2 z}$

B. $\dfrac{dz}{dx + 3z\tan x = 3\sin \cos^2 x}$

C. $\dfrac{dz}{dx} - 3z\tan x = 3\sin x \cos^2 x$

D. $\dfrac{dz}{dx} - z\tan x = \sin x \cos^2 x$

Answer: C

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93. The differential equation $\dfrac{dy}{dx} + Py = Qy^n$, $n > 2$ can be reduced to

linear form y substituting $z = y^{n-1}$ b. $z = y^n$ c. $z = y^{n+1}$ d. $z = y^{1-n}$

A. $z = y^{n-1}$

B. $z = y^n$

C. $z = y^{n+1}$

D. $z = y^{1-n}$

Answer: D

---

94. The solution of the differential equation $\dfrac{dy}{dx} + \dfrac{y}{2}\sec x = \dfrac{\tan x}{2y}$, where $0 \le x < \dfrac{\pi}{2}$, and $y(0) = 1$, is given by

A. $y^2 = 1 - \dfrac{x}{\sec x + \tan x}$

B. $y^2 = 1 + \dfrac{x}{\sec x + \tan x}$

C. $y = 1 + \dfrac{x}{\sec x + \tan x}$

D. $y = 1 - \dfrac{x}{\sec x + \tan x}$

Answer: A

95. The orthogonal trajectories of the family of curves $y = Cx^2$, (C is an arbitrary constant), is

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

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

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

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

Answer: A

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96. The differential equation representing all possible curves that cut each member of the family of circles $x^2 + y^2 - 2Cx = 0$ (C is a parameter) at right angle, is

A. $\dfrac{dy}{dx} = \dfrac{2xy}{x^2 + y^2}$

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

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

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

Answer: B

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97. The orthogonal trajectories of the circle $x^2 + y^2 - ay = 0$, (where a is a parameter), is

A. $x^2 + y^2 - ay = 0$

B. $x^2 + y^2 = Cx$

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

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

Answer: B

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1. The degree of the differential equation

$$x = 1 + \left(\frac{dy}{dx}\right) + \frac{1}{2!}\left(\frac{dy}{dx}\right)^2 + \frac{1}{3!}\left(\frac{dy}{dx}\right)^3 + \ldots\ldots\ldots$$ (A) 3 (B) 2 (C) 1 (D) not defined

A. 3

B. 1

C. not defined

D. none of these

Answer: B

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2. The order and degree of differential equation of all tangent lines to parabola $x^2 = 4y$ is

A. 1,2

B. 2,2

C. 3,1

D. 4,1

Answer: A

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3. The differential equation of the rectangular hyperbola whose axes are the asymptotes of the hyperbola, is

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

B. $x\dfrac{dy}{dx} = -y$

C. $x\dfrac{dy}{dx} = y$

D. $xdy + ydx = C$

Answer: B

4. The differential equation of all ellipses with centres at the origin and the ends of one axis of symmetry at ($\pm 1, 0$), is

A. $(x^2 - 1)y' - xy = 0$

B. $(x^2 + 1)y' + xy = 0$

C. $xy' + (x^2 + 1)y = 0$

D. $(x^2 - 1)y' + (x - 1)y' = 0$

Answer: A

5. Let F be the family of ellipse whose centre is the origin and major axis is the y-axis. Then the differential equation of family F is

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

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

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

D. $\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx}\left(x\dfrac{dy}{dx} - y\right) = 0$

Answer: A

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6. The differential equation of the family of parabola with focus at the origin and the x-axis an axis, is

A. $y\left(\dfrac{dy}{dx}\right)^2 + 4x\dfrac{dy}{dx} = 4y$

B. $y\left(\dfrac{dy}{dx}\right)^2 = 2x\dfrac{dy}{dx} - y$

C. $y\left(\dfrac{dy}{dx}\right)^2 + y = 2xy\dfrac{dy}{dx}$

D. $y\left(\dfrac{dy}{dx}\right)^2 + 2xy\dfrac{dy}{dx} + y - 0$

Answer: B

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7. The differential equation of all conics whose centre lie at the origin is of order

A. 2

B. 3

C. 4

D. none of these

Answer: B

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8. The differential equation of all conics whose axes coincide with the coordinate axes, is

A. 2

B. 3

C. 4

D. 1

Answer: A

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9. The degree of the differential equation satisfying

$$\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y), \text{ is}$$

A. 1

B. 2

C. 3

D. none of these

Answer: A

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10. The order of the differential equation whose general solution is given

by $y = (C_1 + C_2)\sin(x + C_3) - C_4 e^{x + (C_5)}$, is

A. 5

B. 4

C. 2

D. 3

Answer: D

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11. The degree and order of the differential equation of the family of all

parabolas whose axis is x-axs are respectively

A. 2,1

B. 1,2

C. 3,2

D. none of these

Answer: B

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12. The differential equation of all parabolas whose axis are parallel to the

y-axis   is   (a)

$(b)(c)(d)\dfrac{(e)(f)d^{(g)3(h)}(i)y}{j}\left((k)d(l)x^{(m)3(n)}(o)\right)(p)(q)=0(r)$ (s) (b)

$(t)(u)(v)\dfrac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\left((cc)d(dd)y^{(ee)2(ff)}(gg)\right)(hh)(ii)=C(jj$

(kk) (c) *[Math Processing Error]* (ii) (d) *[Math Processing Error]* (ggg)

A. $\dfrac{d^3y}{dx^3}=1$

B. $\dfrac{d^3y}{dx^3}$

C. $\dfrac{d^3y}{dx^3}=0$

D. none of these

Answer: C

▶

13. Find the differential equation of all the circles which pass through the origin and whose centres lie on y-axis.

A. $\left(x^2 - y^2\right) \dfrac{dy}{dx} - 2xy = 0$

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

C. $\left(x^2 - y^2\right) \dfrac{dy}{dx} - xy = 0$

D. $\left(x^2 - y^2\right) \dfrac{dy}{dx} + xy = 0$

Answer: A

14. The differential equation for the family of curves $x^2 - y^2 - 2ay = 0$, where a is an arbitrary constant, is

A. $\left(x^2 + y^2\right) \dfrac{dy}{dx} = 2xy$

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

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

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

Answer: C

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15. The equation of the curve in which the portion of the tangent included between the coordinate axes is bisected at the point of contact, is

A. a parabola

B. an ellipse

C. a circle

D. a hyperbola

Answer: D

16. The solution of the differential equation

$$x = 1 + xy\frac{dy}{dx} + \frac{x^2y^2}{2!}\left(\frac{dy}{d}\right)^2 + \frac{x^3y^3}{3!}\left(\frac{dy}{dx}\right)^3 + is \quad \text{(a)}$$

$(b)(c)y = 1n((d)x(e)) + c(f)$ (g) (b)

$(h)(i)(j)y^{(k)2(l)}(m) = (n)(o)((p)(q)1nx(r))^{(s)2(t)}(u) + c(v)$ (w) (c)

$(d)(e)y = \log x + xy(f)$ (g) (d) $(h)(i)xy = (j)x^{(k)y(l)}(m) + c(n)$ (o)

A. $y = \log_e(x) + C$

B. $y = (\log_e x)^2 + C$

C. $y = \pm\sqrt{(\log_e x)^2 + 2C}$

D. $xy = x^y + k$

Answer: C

17. If the solution of the differential equation

$$\frac{dy}{dx} = \frac{ax + 3}{2y + f}$$

represents a circle, then the value of 'a' is

A. 2

B. -2

C. 3

D. -4

Answer: B

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18. Integral curve satisfying $y' = \dfrac{x^2 + y^2}{x^2 - y^2}$, has the slope at the point

(1,0) of the curve equal to

A. $-\dfrac{5}{3}$

B. -1

C. 1

D. $\dfrac{5}{3}$

Answer: C

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19. The solution of the differential equation $\left(xy^4 + y\right)dx - xdy = 0$, is

A. $4x^4 y^3 + 3x^3 = Cy^3$

B. $3x^3 y^4 + 4y^3 = Cx^3$

C. $3x^4 y^3 + 4x^3 = Cy^3$

D. none of these

Answer: C

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20. The solution of the differential equation

$(x + y)(dx - dy) = dx + dy$, is

A. $x - y = ke^{x-y}$

B. $x + y = ke^{x+y}$

C. $x + y = k(x - y)$

D. $x + y = ke^{x-y}$

Answer: D

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21. Solution of the differential equation

$x\left(\dfrac{dy}{dx}\right)^2 + 2\sqrt{xy}\dfrac{dy}{dx} + y = 0$, is

A. $x + y = a$

B. $\sqrt{x} - \sqrt{y} = a$

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

D. $\sqrt{x} + \sqrt{y} = \sqrt{a}$

Answer: D

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22. If a an arbitrary constant, then solution of the differential equation

$$\frac{dy}{dx} + \sqrt{\frac{1 - y^2}{1 - x^2}} = 0 \text{ is}$$

A. $x\sqrt{1 - y^2} + y\sqrt{1 - x^2} = a$

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

C. $x\sqrt{1 - y^2} - y\sqrt{1 - x^2} = a$

D. $y\sqrt{1 - y^2} - x\sqrt{1 - x^2} = a$

Answer: A

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23. A curve having the condition that the slope of the tangent at some point is two times the slope of the straight line joining the same point to the origin of coordinates is a/an

    A. circle

    B. ellipse

    C. parabola

    D. hyperbola

Answer: C

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24. The orthogonal trajectories of the family of curves an $a^{n-1}y = x^n$ are given by (A) $x^n + n^2 y = cons\,tant$ (B) $ny^2 + x^2 = cons\,tant$ (C) $n^2 x + y^n = cons\,tant$ (D) $y = x$

    A. $x^n + n^2 y =$ constant

B. $ny^2 + x^2 =$ constant

C. $n^2x + y^n =$ constant

D. $n^2x - y^n =$ constant

Answer: B

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25. The orthogonal trajectories of the family of circles given by $x^2 + y^2 - 2ay = 0$, is

A. $x^2 + y^2 - 2kx = 0$

B. $x^2 + y^2 - 2ky = 0$

C. $x^2 + y^2 - 2k_1x - 2k_2y = 0$

D. none of these

Answer: A

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26. If $\phi(x)$ is a differentiable function, then the solution of the different

equation $dy + \{y\phi'(x) - \phi(x)\phi'(x)\}dx = 0$, is

A. $y = \{\phi(x) - 1\} + Ce^{-\phi(x)}$

B. $y\phi(x) = \{\phi(x)\}^2 + C$

C. $ye^{\phi(x)} = \phi(x)e^{\phi(x)} + C$

D. $y - \phi(x) = \phi(x)e^{-\phi(x)}$

Answer: A

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27. The solution of the differential equation

$y(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$, is given by

A. $2\log|x| - \log|y| - \dfrac{1}{xy} = C$

B. $2\log|y| - \log|x| - \dfrac{1}{xy} = C$

C. $2\log|x| + \log|y| + \dfrac{1}{xy} = C$

D. $2\log|y| + \log|x| + \dfrac{1}{xy} = C$

Answer: A

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28. The equation of the family of curves which intersect the hyperbola xy-2 orthogonally is

A. $y = \dfrac{x^3}{6} + C$

B. $y = \dfrac{x^2}{4} + C$

C. $y = \dfrac{-x^3}{6} + C$

D. $y = \dfrac{-x^2}{4} + C$

Answer: A

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29. If $x(t)$ is a solution of $\dfrac{(1+t)dy}{dx} - ty = 1$ and $y(0) = -1$ then $y(1)$

is (a) (b)(c) $-$ (d)$\dfrac{1}{e}2(f)(g)(h)$ (i) (b) (j)(k)$e + (l)\dfrac{1}{m}2(n)(o)(p)$ (q) (c)

(d)(e)$e - (f)\dfrac{1}{g}2(h)(i)(j)$ (k) (d) (l)(m)(n)$\dfrac{1}{o}2(p)(q)(r)$ (s)

A. $-\dfrac{1}{2}$

B. $e + \dfrac{1}{2}$

C. $e - \dfrac{1}{2}$

D. $\dfrac{1}{2}$

Answer: A

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30. The solution of differential equation

$$(1 + y^2) + \left(x - e^{\tan^{-1}y}\right)\dfrac{dy}{dx} = 0, \text{ is}$$

A. $xe^{2\tan^{-1}y} = e^{\tan^{-1}y} + K$

B. $(X - 2) = Ke^{\tan^{-1}y}$

C. $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + K$

D. $xe^{\tan^{-1}y} = \tan^{-1}y + K$

Answer: C

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31. If $\sin x$ is an integrating factor of the differential equation $\dfrac{dy}{dx} + Py = Q$, then write the value of P.

    A. $\log \sin x$

    B. $\cot x$

    C. $\sin x$

    D. $\log \cos x$

Answer: B

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32. A function $y = f(x)$ has a second order derivative $f(x) = 6(x - 1)$. If its graph passes through the point $(2, 1)$ and at that point the tangent to the graph is $y = 3x - 5$ then the function is

A. $(x + 1)^2$

B. $(x - 1)^3$

C. $(x + 1)^3$

D. $(x - 1)^2$

Answer: B

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33. If $xdy = y(dx + ydy)$; $y(1) = 1$ and $y(x) > 0$, then what is $y(-3)$ equal to?

A. 3

B. 2

C. 1

D. 0

Answer: A

34. Tangent is drawn at any point P of a curve which passes through $(1, 1)$ cutting x-axis and y-axis at A and B respectively. If $AP:BP = 3:1,$ then,

A. the differential equation of the curve is $3x\dfrac{dy}{dx} + y = 0$ and the

curve passes through $(1/8, 2)$

B. the differential eqaution of the curve is $3x\dfrac{dy}{dx} - y = 0$ and the

curve pass through $(1/8, -2)$

C. the curve is passing through $(-1/8, -2)$

D. the normal at (1,1) is $x + 3y = 4$

Answer: A

35. Let f be a non-negative function defined on the interval .[0,1].If

$$\int_0^x \sqrt{1 - (f'(t))^2}.\, dt = \int_0^x f(t).\, dt, 0 \le x \le 1 \text{ and f(0)=0,then}$$

A. $f\left(\dfrac{1}{2}\right) < \dfrac{1}{2}$ and $f\left(\dfrac{1}{3}\right) > \dfrac{1}{3}$

B. $f\left(\dfrac{1}{2}\right) > \dfrac{1}{2}$ and $f\left(\dfrac{1}{3}\right) > \dfrac{1}{3}$

C. $f\left(\dfrac{1}{2}\right) < \dfrac{1}{2}$ and $f\left(\dfrac{1}{3}\right) < \dfrac{1}{3}$

D. $f\left(\dfrac{1}{2}\right) > \dfrac{1}{2}$ and $f\left(\dfrac{1}{3}\right) < \dfrac{1}{3}$

Answer: C

36. Solution of the differential equation

$$\cos x\, dy = y(\sin x - y)dx, 0 < x < \dfrac{\pi}{2} \text{ is}$$

A. $y \tan x = \sec x + C$

B. $\tan x = (\sec x + C)y$

C. $\sec x = (\tan x + C)y$

D. $y \sec x = \tan x + C$

Answer: C

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37. Let $f: [1, \infty]$ be a differentiable function such that $f(1) = 2.$ If $\int_1^x f(t)dt = 3xf(x) - x^3$ for all $x \geq 1,$ then the value of $f(2)$ is

A. 3

B. 4

C. 5

D. 6

Answer: D

38. If $\dfrac{dy}{dx} = y + 3$ **and** $y(0) = 2$, **then y(ln 2) is equal to**

A. 7

B. 5

C. 13

D. -2

Answer: A

39. Consider the differential equation $y^2 dx + \left(x - \dfrac{1}{y} \right) dy = 0$ if

$y(1) = 1$ then x is

A. $3 - \dfrac{1}{y} + \dfrac{e^{1/y}}{e}$

B. $1 + \dfrac{1}{y} - \dfrac{e^{\frac{1}{y}}}{e}$

C. $1 - \dfrac{1}{y} + \dfrac{e^{1/y}}{e}$

D. $4 - \dfrac{2}{y} - \dfrac{e^{1/y}}{e}$

Answer: B

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40. The curve that passes through the point $(2, 3)$ and has the property that the segment of any tangent to it lying between the coordinate axes is bisected by the point of contact, is given by

A. $y = \dfrac{6}{x}$

B. $x^2 + y^2 = 13$

C. $\left(\dfrac{x}{2}\right)^2 + \left(\dfrac{y}{3}\right)^2 = 2$

D. $2y - 3x = 0$

Answer: A

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41. Let I be the purchase value of an equipment and V(t) be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation $\left(dV\dfrac{t}{dt} = -k(T-t) \right.$, where $k > 0$ is a constant and T is the total life in years of the equipment. Then the scrap value V(T) of the equipment is : (1) $T^2 - \dfrac{1}{k}$ (2) $I - \dfrac{kT^2}{2}$ (3) $I - \dfrac{k(T-t)^2}{2}$ (4) e^{-kT}

A. $T^2 - \dfrac{I}{k}$

B. $I - \dfrac{kT^2}{2}$

C. $I - \dfrac{(T-t)^2}{2}$

D. e^{-kT}

Answer: D

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42. The general solution of the differential equation $\dfrac{dy}{dx} + \dfrac{2}{x}y = x^2$, is

A. $y = cx^2 + \dfrac{x^3}{5}$

B. $y = cx^{-2} + \dfrac{x^3}{5}$

C. $y = cx^3 - \dfrac{x^3}{4}$

D. $y = cx^{-3}\dfrac{x^2}{4}$

Answer: B

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43. If y(x) satisfies the differential equation

$y' - y\tan x = 2x$ and $y(0) = 0$, then

A. $y\left(\dfrac{\pi}{4}\right) = \dfrac{\pi^2}{8\sqrt{2}}, y'\left(\dfrac{\pi}{3}\right) = \dfrac{4\pi}{3} + \dfrac{2\pi^2}{3\sqrt{3}}$

B. $y\left(\dfrac{\pi}{4}\right) = \dfrac{\pi^2}{4\sqrt{2}}, y'\left(\dfrac{\pi}{4}\right) = \dfrac{\pi^2}{18}$

C. $y\left(\dfrac{\pi}{3}\right) = \dfrac{\pi^2}{9}, y'\left(\dfrac{\pi}{3}\right) = \dfrac{4\pi}{3} + \dfrac{\pi^2}{3\sqrt{3}}$

D. $y\left(\dfrac{\pi}{3}\right) = \dfrac{\pi^2}{4\sqrt{2}}, y'\left(\dfrac{\pi}{3}\right) = \dfrac{\pi^2}{18}$

Answer: A

44. A curve passes through the point $\left(1, \frac{\pi}{6}\right)$. Let the slope of the curve at each point (x, y) be $\frac{y}{x} + \sec\left(\frac{y}{x}\right)$, $x > 0$. Then the equation of the curve is

A. $\sin\left(\frac{y}{x}\right) = \log x + \frac{1}{2}$

B. $\operatorname{cosec}\left(\frac{y}{x}\right) = \log x + 2$

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

D. $\cos\left(\frac{2y}{x}\right) = \log x + \frac{1}{2}$

Answer: A

45. Consider the family of all circles whose centers lie on the straight line $y = x$. If this family of circles is represented by the differential equation $Py' + Qy' + 1 = 0$, where P, Q are functions of x, y and

$y'\left(here\ y' = \dfrac{dy}{dx}, y = \dfrac{d^2y}{dx^2}\right)$, then which of the following statements is (are) true? (a) (b)(c)$P = y + x$(d) (e) (b) (f)(g)$P = y - x$(h) (i) (c) (d)(e)$P + Q = 1 - x + y + y + $(f)(g)$\left((h)(i)y^{(j)\ '(k)}(l)(m)\right)^{(n)2(o)}$ (p)

(r)　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(s)

(t)(u)$P - Q = x + y - y - $(v)(w)$\left((x)(y)y^{(z)\ '(aa)}(bb)(cc)\right)^{(dd)2(ee)}$ (f j

(hh)

A. $P = y + x$

B. $P = y - x$

C. $P + Q = 1 - x + y + y' + (y')^2$

D. $P - Q = x + y - y' - (y')^2$

Answer: B::C

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46. The sum of the squares of the perpendicular drawn from the points $(0,1)$ and $(0, -1)$ to any tangent to a curve is 2. The equation of the curve, is

A. $2y = C(x+2)$

B. $y = C(x+1)$

C. $y = C(x+2)$

D. $y = C(x+2)$

Answer: B

47. The solution of the equation $(2+x)dy - ydx = 0$ represents a curve passing through a fixed point P, then the area of equilateral triangle with P as one vertex and $x+y = 0$ as its one side, is

A. $2\sqrt{3}$

B. $\sqrt{3}$

C. $\dfrac{2}{\sqrt{3}}$

D. $\dfrac{4}{\sqrt{3}}$

Answer: C

48. If $\dfrac{dx}{dy} = (e^y - x)$, where y(0)=0, then y is expressed explicitly as

A. $\dfrac{1}{2}\ln(1 + x^2)$

B. $\ln(1 + x^2)$

C. $\ln\left(x - \sqrt{1 + x^2}\right)$

D. $\ln\left(x + \sqrt{1 - x^2}\right)$

Answer: C

Section Ii Assertion Reason Type

1. Let y(x) be a solution of $xdy + ydx + y^2(xdy - ydx) = 0$ satisfying y(1)=1.

Statement -1 : The range of y(x) has exactly two points.

Statement-2 : The constant of integration is zero.

    A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

    B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

    C. Statement-1 is True, Statement-2 is False.

    D. Statement-1 is False, Statement-2 is True.

Answer: C

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2. Let a solution $y = y(x)$ of the differential equation

$$x\sqrt{x^2 - 1}\,dy - y\sqrt{y^2 - 1}\,dx = 0 \text{ satisfy } y(2) = \frac{2}{\sqrt{3}}$$

Statement-1, $y(x) = \sec\left(\sec^{-1} x - \frac{\pi}{6}\right)$

Statement-2 : y(x) is given by $\dfrac{1}{y} = \dfrac{2\sqrt{3}}{x} - \sqrt{1 - \dfrac{1}{x^2}}$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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3. Let a solution $y = y(x)$ of the differential equation

$\dfrac{dy}{dx} \cos x + y \sin x - 1$ satisfy y(0)=1

Statement-1: $y(x) = \sin\left(\dfrac{\pi}{4} + x\right)$

Statement-2: The integrating factor of the given differential equation is

sec x.

   A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct

      explanation for Statement-1.

   B. Statement-1 is True, Statement-2 is True, Statement-2 is not a

      correct explanation for Statement-1.

   C. Statement-1 is True, Statement-2 is False.

   D. Statement-1 is False, Statement-2 is True.

Answer: A

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4. Let y_1 and y_2 be the solutions of the differential equation $\dfrac{dy}{dx} + Py = Q$, where P and Q are functional of x.

Statement-1 : $\dfrac{y_2 - y_1}{y_1} = Ce^{-\int \frac{Q}{y_1}dx}$

Statement-2 : If $y_2 = y_1 z$, then $z = 1 + Ce^{\int \frac{-Q}{y_1}dx}$, where C is an arbitrary constant.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

5. Let y_1 and y_2 be the two solutions of the differential equation $\dfrac{dy}{dx} + Py = Q$, where P and Q are functions of x,

Statement-1: The linear combination $ay_1 + by_2$ will be a solution of the differential equation, if $a + b = 1$.

Statement-2 : The general solution of the differential equation is $y = y_1 + C(y_1 - y_2)$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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1. The general solution of the differential equation $\dfrac{dy}{dx} = \dfrac{x^2}{y^2}$ is

A. $x^3 - y^3 = C$

B. $x^3 + y^3 = C$

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

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

Answer: A

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2. The general solution of the differential equaiton $(1 + y^2) dx + (1 + x^2) dy = 0$, is

A. $x - y = C(1 - xy)$

B. $x - y = C(1 + xy)$

C. $x + y = C(1 - xy)$

D. $x + y = C(1 + xy)$

Answer: C

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3. The order of the differential equation of all circle of radius r, having centre on y-axis and passing through the origin, is

A. 1

B. 2

C. 3

D. 4

Answer: A

4. Write the order of the differential equation whose solution is

$y = a \cos x + bs \in x + ce^{-x}.$

A. 3

B. 2

C. 1

D. none of these

Answer: A

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5. The solution of the equation $\dfrac{dy}{dx} = \dfrac{x+y}{x-y}$, is

A. $C(x^2 + y^2)^{1/2} + e^{\tan^{-1}\left(\frac{y}{x}\right)} = 0$

B. $C(x^2 + y^2)^{1/2} + e^{\tan^{-1}\left(\frac{y}{x}\right)}$

C. $C(x^2 - y^2)^{1/2} + e^{\tan^{-1}\left(\frac{y}{x}\right)}$

D. none of these

Answer: B

6. Writhe the order of the differential equation of the family of circles of radius r.

   A. 2

   B. 3

   C. 4

   D. none of these

Answer: A

7. The differential equation of all circles in the first quadrant which touch the coordiante axes is of order

A. 1

B. 2

C. 3

D. none of these

Answer: A

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8. The differential equation whose solution is $(x - h)^2 + (y - k)^2 = a^2$

is (a is a constant)

A. $\left[1 + \left(\dfrac{dy}{dx}\right)^2\right]^3 = a^2 \dfrac{d^2y}{dx^2}$

B. $\left[1 + \left(\dfrac{dy}{dx}\right)^2\right]^3 = a^2 \left(\dfrac{d^2y}{dx^2}\right)^2$

C. $\left[1 + \left(\dfrac{dy}{dx}\right)\right]^3 = a^2 \left(\dfrac{d^2y}{dx^2}\right)^2$

D. none of these

Answer: B

9. The differential equation $y\dfrac{dy}{dx} + x = a$ (a is any constant) represents

A. a set of circles having centre on the y-axis

B. a set of circle centre on the x-axis

C. a set of ellipses

D. none of these

Answer: B

10. The differential equation of displacement of all "Simple harmonic motions" of given period $\dfrac{2p}{n}$, is

A. $\dfrac{d^2x}{dt^2} + nx = 0$

B. $\dfrac{d^2x}{dt^2 + n^2x = 0}$

C. $\dfrac{d^2x}{dt^2} - n^2x = 0$

D. $\dfrac{d^2x}{dt^2} + \dfrac{1}{n^2}x = 0$

Answer: B

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11. The differential equation of family of curves whose tangent form an angle of $\dfrac{\pi}{4}$ with the hyperbola $xy = C^2$ is

A. $\dfrac{dy}{dx} = \dfrac{x^2 + c^2}{x^2 - C^2}$

B. $\dfrac{dy}{dx} = \dfrac{x^2 - C^2}{x^2 + C^2}$

C. $\dfrac{dy}{dx} = -\dfrac{C^2}{x^2}$

D. none of these

Answer: B

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12. The differential equation of all parabolas whose axis are parallel to the y-axis is (a) $(b)(c)(d)\dfrac{(e)(f)d^{(g)3(h)}(i)y}{j}\Big((k)d(l)x^{(m)3(n)}(o)\Big)(p)(q) = 0(r)$ (s) (b) $(t)(u)(v)\dfrac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\Big((cc)d(dd)y^{(ee)2(ff)}(gg)\Big)(hh)(ii) = C(jj$ (kk) (c) *[Math Processing Error]* (ii) (d) *[Math Processing Error]* (ggg)

A. $\dfrac{d^3y}{dx^3} = 0$

B. $\dfrac{d^2x}{dy^2} = C$

C. $\dfrac{d^3y}{dx^3} + \dfrac{d^2x}{dy^2} = 0$

D. $\dfrac{d^2y}{dx^2} + 2\dfrac{dy}{dx} = C$

Answer: A

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13. Find the curve for which the length of normal is equal to the radius vector.

A. $y^2 \pm x^2 = k^2$

B. $y \pm x = k$

C. $y^2 = kx$

D. none of these

Answer: A

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14. The differential equation of all parabola having their axis of symmetry coinciding with the x-axis is

A. $y\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx^2}\right) = 0$

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

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

D. none of these

Answer: A

15. The equation of a curve passing through $\left(2, \dfrac{7}{2}\right)$ and having gradient $1 - \dfrac{1}{x^2}$ at (x, y) is (a) (b)(c)$y = (d)x^{(e)2(f)}(g) + x + 1(h)$ (i) (b) $(j)(k)xy = (l)x^{(m)2(n)}(o) + x + 1(p)$ (q) (c) $(d)(e)xy = x + 1(f)$ (g) (d) None of these

A. $y = x^2 + x + 1$

B. $xy = x^2 + x + 1$

C. $xy = x + 1$

D. none of these

Answer: B

16. The equation of the curve through the point $(1, 0)$, whose slope is $\dfrac{y-1}{x^2+x}$

A. $(y - 1)(x + 1) + 2x = 0$

B. $2x(y - 1) + x + 1 = 0$

C. $x(y - 1)(x + 1) + 2 = 0$

D. none of these

Answer: A

17. The slope of a curve at any point is the reciprocal of twice the ordinate at that point and it passes through the point(4,3). The equation of the curve is:

A. $x^2 = y + 5$

B. $y^2 = x - 5$

C. $y^2 = x + 5$

D. $x^2 = y - 5$

Answer: C

18. A partical moves in a straight line with a velocity given by $\dfrac{dx}{dt} = x + 1$ (x is the distance described). The time taken by a particle to traverse a distance of 99 metres, is

A. $\log_{10} e$

B. $\log_e 10$

C. $2\log_{10} e$

D. $\dfrac{1}{2}\log_{10} e.$

Answer: B

19. If $\dfrac{dy}{dx} = e^{-2y}$ and $y = 0$ when $x = 5,$ then the value of x for $y = 3$ is

A. e^5

B. $e^6 + 1$

C. $\dfrac{e^6 + 9}{2}$

D. $\log_e 6$

Answer: C

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20. The equation of curve passing through origin and satisfying the differential equation $\left(1 + x^2\right)\dfrac{dy}{dx} + 2xy = 4x^2$, is

A. $\left(1 + x^2\right)y = x^3$

B. $2\left(1 + x^2\right)y = 3x^3$

C. $3\left(1 + x^2\right)y = 4x^3$

D. none of these

Answer: C

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21. The slope of the tangent at (x, y) to a curve passing through $\left(1, \dfrac{\pi}{4}\right)$ is given by $\dfrac{y}{x} - \cos^2\left(\dfrac{y}{x}\right)$, then the equation of the curve is (a) (b)(c)$y = $ (d)(e)$\tan^{(f)\,(g)\,-1\,(h)}$ (i)$\left((j)(k)\log\left((l)(m)(n)\dfrac{e}{o}x(p)(q)(r)\right)\right)$ (s) (u) (v) *[Math Processing Error]* (pp) (qq) *[Math Processing Error]* (kkk) (d) none of these

A. $y = \tan^{-1}\left\{\log\left(\dfrac{e}{x}\right)\right\}$

B. $y = x\tan^{-1}\left\{\log\left(\dfrac{x}{e}\right)\right\}$

C. $y = x\tan^{-1}\left\{\log\left(\dfrac{e}{x}\right)\right\}$

D. none of these

Answer: C

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22. If $\phi(x) = \phi'(x)$ and $\phi(1) = 2$, then $\phi(3)$ equals

A. e^2

B. $2e^2$

C. $3e^2$

D. $2e^3$

Answer: B

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23. If f(x), g(x) be twice differentiable functions on [0,2] satisfying

$f''(x) = g''(x)$, $f'(1) = 2g'(1) = 4$ and $f(2) = 3g(2) = 9$, then

$f(x) - g(x)$ at x = 4 equals (A) 0 (B) 10 (C) 8 (D) 2

A. 0

B. 10

C. 8

D. 2

Answer: B

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24. The curve in which the slope of the tangent at any point equal the ratio of the abscissa to the ordinate of the point is

A. an ellipse

B. a parabola

C. a rectangular hyperbola

D. a circle

Answer: C

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25. The curve in the first quadrant for which the normal at any point (x, y) and the line joining the origin to that point form an isosceles triangle with the x-axis as base is (a) an ellipse (b) a rectangular hyperbola (c) a circle (d) None of these

    A. an ellipse

    B. a rectangular hyperbola

    C. a circle

    D. none of these

Answer: B

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26. The function $f(\theta) = \dfrac{d}{dth\eta}\displaystyle\int_0^\theta \dfrac{dx}{1 - \cos\theta\cos x}$ satisfies the differential equation (a) $(b)(c)(d)\dfrac{(e)df((f)\theta(g))}{h}((i)dth\eta)(j)(k) + 2f((l)\theta(m)) = 0(n)$ (o) (p) $(q)(r)(s)\dfrac{(t)df}{u}((v)dth\eta)(w)(x) - 2f((y)\theta(z))\cot\theta = 0(aa)$ (bb) (cc)

$$(dd)(ee)(ff)\frac{(gg)df}{hh}((ii)dth\eta)(jj)(kk) + 2f((ll)\theta(mm)) = 0(nn)$$

(oo)   (d)

$$(pp)(qq)(rr)\frac{(ss)df}{tt}((uu)dth\eta)(vv)(ww) - 2((xx)\theta(yy)) = 0(zz)$$

(aaa)

A. $\dfrac{df}{d\theta} + 2f(\theta)\cot\theta = 0$

B. $\dfrac{df}{d\theta} - 2f(\theta)\cot\theta = 0$

C. $\dfrac{df}{d\theta} + 2f(\theta) = 0$

D. $\dfrac{df}{d\theta} - 2f(\theta) = 0$

Answer: A

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27. The differential equation of all ellipses centred at the origin is

A. $y_2 + xy_1^2 - yy_1 = 0$

B. $xyy_2 + xy_1^2 - yy_1 = 0$

C. $yy_2 + xy_1^2 - xy_1 = 0$

D. none of these

Answer: B

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28. The differential equation of the curve for which the initial ordinate of any tangent is equal to the corresponding subnormal (a) is linear (b) is homogeneous of second degree (c) has separable variables (d) is of second order

A. homogeeous and linear

B. homogeneous only

C. in variable separable form

D. linear only

Answer: A

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29. The equation of the curve whose subnormal is constant is

A. $y = ax + b$

B. $y^2 = 2ax + b$

C. $ay^2 - x^2 = a$

D. none of these

Answer: B

30. The degree of the differential equation

$y_3^{2/3} + 2 + 3y_2 + y_1 = 0$, is

A. 1

B. 2

C. 3

D. none of these

Answer: B

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31. The degree of the differential equation satisfying

$$\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y),$$ is

A. 1

B. 2

C. 3

D. none of these

Answer: A

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32. The order of the differential equation whose general solution is given

by $y = (C_1 + C_2)\cos(x + C_3) - C_4 e^{x + 4_5}$, where C_1, C_2, C_3, C_4, C_5,

are arbitrary constants, is (a) 5 (b) 4 (c) 3 (d) 2

A. 5

B. 4

C. 3

D. 2

Answer: C

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33. The equation of the curve satisfying the differential equation

$y^2(x^2 + 1) = 2xy$ passing through the point (0,1) and having slope of

tangnet at $x = 0$ as 3, is (Here $y = \dfrac{dy}{dx}$ and $y_2 = \dfrac{d^2y}{dx^2}$)

A. $y = x^2 + 3x + 2$

B. $y^2 = x^2 + 3x + 1$

C. $y = x^3 + 3x + 1$

D. none of these

Answer: C

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34. A differential equation associated to the primitive $y = a + be^{5x} + ce^{-7x}$ is (where y_n is nth derivative w.r.t. x) (a) $(b)(c)(d)y_e3(f)(g) + 2(h)y_i2(j)(k) - (l)y_m1(n)(o) = 0(p)$ (q) (r) *[Math Processing Error]* (hh) (ii) *[Math Processing Error]* (yy) (d) none of these (zz) *[Math Processing Error]* (ddd) y_n reprersents $(eee)(fff)nth(ggg)$ (hhh) order derivative.

A. $y_3 + 2y_2 - y_1 = 0$

B. $4y_3 + 5y_2 - 20y_1 = 0$

C. $y_3 + 2y_2 - 35y_1 = 0$

D. none of these

Answer: C

35. Write the order of the differential equation associated with the primitive $y = C_1 + C_2 e^x + C_3 e^{-2x + C_4}$, $where\ C_1, C_2, C-3, C_4$ are arbitrary constants.

A. 3

B. 4

C. 2

D. none of these

Answer: A

36. Obtain the differential equation of the family of circles passing through the point (a,0) and (-a,0).

A. $y_1 \left(y^2 - x^2\right) + 2xy + a^2$

B. $y_1 y^2 + xy + a^2 x^2 = 0$

C. $y_1 \left(y^2 - x^2 + a^2\right) + 2xy = 0$

D. none of these

Answer: C

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37. The solution of the differential equation $\left(\dfrac{dy}{dx}\right)\left(\dfrac{d^3 y}{dx^3}\right) = 3\dfrac{d^2 x}{dy^2}$, is

A. $x = A_1 y^2 + A_2 y + A_3$

B. $x = A_1 y + A_2$

C. $x = A_1 y^2 + A_2 y$

D. none of these

Answer: A

---

38. The degree and order of the differential equation of the family of all

parabolas whose axis is x-axs are respectively

A. 2

B. 1,2

C. 3,2

D. none of these

Answer: B

---

39. The differential equation of all parabolas whose axis are parallel to

the   y-axis   is   (a)

$$(b)(c)(d)\frac{(e)(f)d^{(g)3(h)}(i)y}{j}\left((k)d(l)x^{(m)3(n)}(o)\right)(p)(q)=0(r)\text{ (s) }(b)$$

$$(t)(u)(v)\frac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\left((cc)d(dd)y^{(ee)2(ff)}(gg)\right)(hh)(ii)=C(jj$$

(kk) (c) *[Math Processing Error]* (ii) (d) *[Math Processing Error]* (ggg)

A. $y_2 = 2y_1 + x$

B. $y_3 = 2y_1$

C. $y_2^3 = y_1$

D. none of these

Answer: D

---

40. The equation of the curve which is such that the portion of the axis of x cut off between the origin and tangent at any point is proportional to the ordinate of that point is (a) $(b)(c)x = y(a - b\log x)(d)$ (e) (f) $(g)(h)\log x = b(i)y^{(j)2(k)}(l) + a(m)$ (n) (o) $(p)(q)(r)x^{(s)2(t)}(u) = y(a - b\log y)(v)$ (w) (d) None of these

A. $x = y(a - b\log x)$

B. $\log x = by^2 + a$

C. $x = y(a - b\log y)$

D. none of these

Answer: C

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41. The solution of $\dfrac{dy}{dx} = \dfrac{ax + h}{by + k}$ represent a parabola when (a) (b)(c)$a = 0, b \neq 0$(d) (e) (b) (f)(g)$a \neq 0, b \neq 0$(h) (i) (c) (d)(e)$b = 0, a \neq 0$(f) (g) (d) (h)(i)$a = 0, b \in R$(j) (k)

A. $a = 0, b = 0$

B. $a = 1, b = 2$

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

D. $a = 2, b = 1$

Answer: C

42. The solution of the differential equation $y\dfrac{dy}{dx} = x - 1$ satisfying y(1)

= 1, is

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

B. $y^2 = 2x^2 - x - 1$

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

D. none of these

Answer: A

43. The differential equation of the family of circles of fixed radius r and

having their centres on y-axis is:

A. $y^2 \left(1 + y_1^2\right) = r^2 y_1^2$

B. $y^2 = r^2 y_1 + y_1^2$

C. $x^2 \left(1 + y_1^2\right) = r^2 y_1^2$

D. $x^2 = r^2 y_1 + y_1^2$

Answer: C

44. The solution of $\dfrac{dv}{dt} + \dfrac{k}{m}v = -g$ is (a)

$(b)(c)v = c(d)e^{(e)\,(f)\,(g)\,\frac{k}{h}g\,(i)\,(j)t(k)}\,(l) - (m)\dfrac{(n)mg}{o}k(p)(q)(r)$ (s)

(b) *[Math Processing Error]* (kk) (c)

$(d)(e)v(f)e^{(g)\,(h)\,(i)\,\frac{k}{j}m(k)\,(l)t(m)}\,(n) = c - (o)\dfrac{(p)mg}{q}k(r)(s)(t)$ (u)

(d) *[Math Processing Error]* (mm)

A. $v = ce^{-\frac{k}{m}t} - \dfrac{mg}{k}$

B. $v = c - \dfrac{mg}{k}e^{-\frac{k}{m}l}$

C. $ve^{-\frac{k}{m}t} = c - \dfrac{mg}{k}$

D. $ve^{\frac{k}{m}t} = c - \dfrac{mg}{k}$

Answer: A

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45. The solution of $ydx - xdy + 3x^2y^2e^{x^3}$ dx = 0 is

A. $\dfrac{x}{y} + e^3 = C$

B. $\dfrac{x}{y} - e^3 = 0$

C. $-\dfrac{x}{y} + e^{x^3} = C$

D. none of these

Answer: A

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46. The curve for which the length of the normal is equal to the length of the radius vector is/are (a) circles (b) rectangular hyperbola (c) ellipses (d) straight lines

A. only circles

B. only rectangular hyperbola

C. either circles or rectangular hyperbolas

D. none of these

Answer: C

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47. The family of curves represented by $\dfrac{dy}{dx} = \dfrac{x^2 + x + 1}{y^2 + y + 1}$ and the family represented by $\dfrac{dy}{dx} + \dfrac{y^2 + y + 1}{x^2 + x + 1} = 0$

A. touch each other

B. are orthogonal

C. are one and the differential

D. none of these

Answer: B

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48. The form of the differential equation of the central conics, is

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

B. $x + y\dfrac{dy}{dx} = 0$

C. $x\left(\dfrac{dy}{dx}\right)^2 + xy\dfrac{d^2y}{dx^2} = y\dfrac{dy}{dx}$

D. none of these

Answer: C

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49. The solution of the differential eqaution

$$\left(x^2 - yx^2\right)\frac{dy}{dx} + y^2 + xy^2 = 0, \text{ is}$$

A. $\log\left(\dfrac{x}{y}\right) = \dfrac{1}{x} + \dfrac{1}{y} + C$

B. $\log\left(\dfrac{y}{x}\right) = \dfrac{1}{x} + \dfrac{1}{y} + C$

C. $\log(xy) = \dfrac{1}{x} + \dfrac{1}{y} + C$

D. $\log(xy) + \dfrac{1}{x} + \dfrac{1}{y} = C$

Answer: A

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50. The solution of the differential equation

$$\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{\left(1+x^2\right)^2}, \text{ is}$$

A. $y\left(1 - x^2\right) = \tan^{-1}x + C$

B. $y\left(1 + x^2\right) = \tan^{-1}x + C$

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

D. $y(1 - x^2)^2 = \tan^{-1} x + C$

Answer: B

51. The equation of the curve through the point (1,0) which satisfies the differential equatoin $(1 + y^2) dx - xy dy = 0$, is

A. $x^2 + y^2 = 4$

B. $x^2 - y^2 \equiv$

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

D. none of these

Answer: B

52. The differential equation of family of curves $x^2 + y^2 - 2ax = 0$, is

A. $x^2 - y^2 - 2xyy' = 0$

B. $y^2 - x^2 = 2xyy'$

C. $x^2 + y^2 + 2y'' = 0$

D. none of these

Answer: A

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53. The solution of the differential equation
$$\frac{dy}{dx} - \frac{\tan y}{x} = \frac{\tan y \sin y}{x^2}, \text{ is}$$

A. $\dfrac{x}{\sin y} + \log x - C$

B. $\dfrac{y}{\sin x} + \log x = C$

C. $\log y + x = C$

D. $\log x + y = C$

Answer: A

54. The solution of $\dfrac{dy}{dx} + 2y\tan x = \sin x,$ is

A. $y\sec^3 x = \sec^2 x + C$

B. $y\sec^2 x = \sec x + C$

C. $y\sin x = \tan x + C$

D. none of these

Answer: B

55. The solution of the differential equation $\dfrac{dy}{dx} + \dfrac{y}{x} = x^2,$ is

A. $y = \dfrac{x^2}{4} + Cx^{-2}$

B. $y = x^{-1} + Cx^{-3}$

C. $y = \dfrac{x^3}{4} + Cx^{-1}$

D. $xy = x^2 + C$

Answer: C

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56. The solution of differential equation

$$\left(1 + y^2\right) + \left(x - e^{\tan^{-1}y}\right)\dfrac{dy}{dx} = 0, \text{ is}$$

A. $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + k$

B. $2xe^{\tan^{-1}y} = e^{\tan^{-1}y} + k$

C. $xe^{\tan^{-1}y} = e^{\tan^{-1}y} + k$

D. $xe^{\tan^{-1}y}$

Answer: A

57. Solution of $x\dfrac{dy}{dx} + y = xe^x$, is

A. $xy = e^x(x+1) + C$

B. $xy = e^x(x-1) + C$

C. $xy = e^x(1-x) + C$

D. $xy = e^y(y-1) + C$

Answer: B

58. The tangent at any point (x, y) of a curve makes an angle $\tan^{-1}(2x + 3y)$ with x-axis. Find the equation of the curve if it passes through (1,2).

A. $6x + 9y + 2 = 26e^{3(x-1)}$

B. $6x - 9y + 2 = 26e^{3(x-1)}$

C. $6x + 9y - 2 = 26e^{3(x-1)}$

D. $6x - 9y - 2 = 26e^{3(x-1)}$

Answer: A

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59. The integrating factor of the differential equation $\dfrac{dy}{dx} + y = \dfrac{1+y}{x}$, is

A. $\dfrac{x}{e^x}$

B. $\dfrac{e^x}{x}$

C. xe^x

D. e^x

Answer: B

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60. The degree of the differential equation corresponding to the family of

curves $y = a(x + a)^2$, where a is an arbitrary constant is

A. 1

B. 2

C. 3

D. none of these

Answer: C

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61. The degree of the differential equation of all curves having normal of

constant length 'c' is

A. 1

B. 3

C. 4

D. none of these

Answer: D

---

62. The differential equation of the family of ellipses having major and minor axes respectively along the x and y-axes and minor axis is equal to half of the major axis, is

A. $xy' - 4y = 0$

B. $4xy' + y = 0$

C. $4yy' + x = 0$

D. $yy' + 4x = 0$

Answer: C

63. The degree of the differential equation satisfying the relation

$$\sqrt{1+x^2} + \sqrt{1+y^2} = \lambda\left(x\sqrt{1+y^2} - y\sqrt{1+x^2}\right)$$ is

A. 1

B. 2

C. 3

D. none of these

Answer: A

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64. The differential eqaution of the family of curve $y^2 = 4a(x+1)$, is

A. $y^2 = 4\dfrac{dy}{dx}\left(x + \dfrac{dy}{dx}\right)$

B. $2y = \dfrac{dy}{dx} + 4a$

C. $y^2\left(\dfrac{dy}{dx}\right)^2 + 2xy\dfrac{dy}{dx} - y^2 = 0$

D. $y^2 \dfrac{dy}{dx} + 4y = 0$

Answer: C

65. Find the equation of the curve in which the subnormal varies as the square of the ordinate.

A. $y = Ce^{2\lambda x}$

B. $y = Ce^{\lambda x}$

C. $y^2/2 + \lambda x = C$

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

Answer: B

66. Solution of the differential equation $xdy - ydx = 0$ represents

    A. a parabola whose vertax is at the origin

    B. a circle whose centre is at the origin

    C. a rectangular hyperbola

    D. straight lines passing through the origin

Answer: D

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67. The equation of the curve whose subnormal is twice the abscissa, is

    A. a circle

    B. a parabola

    C. an ellipse

    D. a hyperbola

Answer: D

68. The solution of the differential equation

$$\frac{x}{x^2 + y^2} dy = \left(\frac{y}{x^2 + y^2} - 1\right) dx, \text{ is}$$

A. $y = x \cot(C - x)$

B. $\cos^{-1}. \frac{y}{x} = (-x + C)$

C. $y = x \tan(C - x)$

D. $\frac{y^2}{x^2} = x \tan(C - x)$

Answer: C

69. A curve passes through the point (0,1) and the gradient at (x,y) on it is $y(xy - 1)$. The equation of the curve is

A. $y(x - 1) = 1$

B. $y(x + 1) = 1$

C. $x(y + 1) = 1$

D. $x(y - 1) = 1$

Answer: B

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70. The equation of the curve through the point $(1, 0)$, whose slope is $\dfrac{y - 1}{x^2 + x}$

A. $xy + x + y - 1 = 0$

B. $xy - x - y - 1 = 0$

C. $(y - 1)(x + 1) = 2x$

D. $y(x + 1) - x + 1 = 0$

Answer: A

71. The differential equation for which $\sin^{-1} x + \sin^{-1} y = c$ is given by

A. $\sqrt{1 - x^2}dy + \sqrt{1 - y^2}dx = 0$

B. $\sqrt{1 - x^2}dx + \sqrt{1 - y^2}dy = 0$

C. $\sqrt{1 - x^2}dx - \sqrt{1 - y^2}dy = 0$

D. $\sqrt{1 - x^2}dy - \sqrt{1 - y^2}dx = 0$

Answer: A

72. Solution of the differential equation $\dfrac{dx}{x} + \dfrac{dy}{y} = 0$ is

A. $\log x = \log y$

B. $\dfrac{1}{x} + \dfrac{1}{y} = c$

C. $x + y = c$

D. $xy = c$

Answer: D

73. The order of the differential equation of family of circles touching two given circles externally is

A. 1

B. 2

C. 3

D. none of these

Answer: A

74. The function $f(x)$ satisfying the equation $f^2(x) + 4f'(x)f(x) + (f'(x))^2 = 0$

A. $Ce^{\left(2+\sqrt{3}\right)x}$

B. $Ce^{\left(4\pm\sqrt{5}\right)x}$

C. $Ce^{\left(-2\pm\sqrt{3}\right)x}$

D. $C\log\left(1+\sqrt{3}\right)x$

Answer: C

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Chapter Test

1. If $\left(x^2 + y^2\right)dy = xydx$ and y(1)=1 and $y(x_o) = e$, then $x_o =$

A. $\sqrt{2}e$

B. $\sqrt{3}e$

C. $\sqrt{5}e$

D. $e/\sqrt{2}$

Answer: B

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2. The differential equation of the family of curves $y^2 = 4xa(x+1)$, is

A. $y^2 = 4\dfrac{dy}{dx}\left(x + \dfrac{dy}{dx}\right)$

B. $y^2\left(\dfrac{dy}{dx}\right)^2 + 2xy\dfrac{dy}{dx} - y^2 = 0$

C. $2y\dfrac{dy}{dx} = 4a$

D. $y^2 = \dfrac{dy}{d} + 4y = 0$

Answer: B

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3. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equations?

A. $\dfrac{dy}{dx} + my = 0$

B. $\dfrac{dy}{dx} - my = 0$

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

D. $\dfrac{d^2y}{dx} + m^2 = 0$

Answer: C

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4. The solution of the differential equation $\dfrac{dy}{dx} = e^{y+x} + e^{y-x}$, is

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

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

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

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

Answer: B

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5. The differential equation of the family of curves $y = e^{2x}(a\cos x + b\sin x)$ where, a and b are arbitrary constants, is given by

A. $y_2 - 4y_1 + 5y = 0$

B. $2y_2 - y_1 + 5y = 0$

C. $y_2 + 4y_1 - 5y = 0$

D. $y_2 - 2y_1 + 5y = 0$

Answer: A

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6. The differential equation obtained by eliminating A and B from $y = A\cos\omega t + B\sin\omega t$ is (i) $y'' + y' = 0$ (ii) $y'' + w^2y = 0$ (iii) $y'' - w^2y = 0$ (iv) $y'' + y = 0$

A. $y^n + y' = 0$

B. $y^n + w^2y = 0$

C. $y^n = w^2y$

D. $y^n + y = 0$

Answer: B

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7. The solution of $\dfrac{dy}{dx} = \left(\dfrac{y}{x}\right)^{1/3}$, is

A. $x^{2/3} + y^{2/3} = C$

B. $x^{1/3} + y^{1/3} = C$

C. $y^{2/3} - x^{2/3} = C$

D. $y^{1/3} - x^{1/3} = C$

Answer: C

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8. The slope of the tangent at (x, y) to a curve passing through a point $(2, 1)$ is $\dfrac{x^2 + y^2}{2xy}$, then the equation of the curve is (a) $(b)(c)2\left((d)(e)(f)x^{(g)2(h)}(i) - (j)y^{(k)2(l)}(m)(n)\right) = 3x(o)$ (p) (b) [Math Processing Error] (ee) (c) $(d)(e)x\left((f)(g)(h)x^{(i)2(j)}(k) - (l)y^{(m)2(n)}(o)(p)\right) = 6(q)$ (r) (d) $(s)(t)x\left((u)(v)(w)x^{(x)2(y)}(z) + (aa)y^{(bb)2(cc)}(dd)(ee)\right) = 10(ff)$ (gg)

A. $2(x^2 - y^2) = 3x$

B. $2(x^2 - y^2) = 6y$

C. $x(x^2 - y^2) = 6$

D. $x(x^2 + y^2) = 10$

Answer: A

9. The solution of the differential equaton
$$y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right), \text{ is}$$

A. $(x + a)(x + ay) = Cy$

B. $(x + a)(ay - 1) = Cay$

C. $(x + a)(1 - ay) = C$

D. none of these

Answer: B

10. The solution of the differential equation $(x + 2y^2)\frac{dy}{dx} = y$, is

A. $x = y^2 + C$

B. $y = x^2 + C$

C. $x = y(y^2 + C)$

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

Answer: C

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11. The general solution of the differential equation $\dfrac{dy}{dx} + \dfrac{\sin(x + y)}{2} = \dfrac{\sin(x - y)}{2}$ is (a) $(b)(c)\log\tan\left((d)(e)(f)\dfrac{y}{g}2(h)(i)(j)\right) = c - 2\sin x(k)$ (l) (m) *[Math Processing Error]* (ee) (ff) *[Math Processing Error]* (uu) (vv) $(ww)(\times)\log\tan\left((yy)(zz)(aaa)\dfrac{y}{bbb}4(ccc)(ddd) + (eee)\dfrac{\pi}{fff}4(ggg)(hhh)\right)$ (rrr)

A. $\log\tan\left(\dfrac{y}{2}\right) = C - 2\sin x$

B. $\log\tan\left(\dfrac{y}{4}\right) = C - 2\sin\left(\dfrac{x}{2}\right)$

C. $\log \tan\left(\dfrac{y}{2} + \dfrac{\pi}{4}\right) = C - 2\sin x$

D. $\log \tan\left(\dfrac{y}{2} + \dfrac{\pi}{4}\right) = C - 2\dfrac{\sin(x)}{2}$

Answer: B

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12. The solution of $\dfrac{dy}{dx} - y = 1,\ y(0) = 1$ is given by y(x)=

A. $-\exp(x)$

B. $-\exp(-x)$

C. -1

D. $2\exp(x) - 1$

Answer: D

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13. The number of solution of $y' = \dfrac{x+1}{x-1}$, $y(1) = 2$, is

A. none

B. one

C. two

D. infinite

Answer: A

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14. What is the solution of $y' = 1 + x + y^2 + xy^2$, $y(0) = 0$?

A. $y^2 = \exp\left(x + \dfrac{x^2}{2}\right) - 1$

B. $y^2 = 1 + C\exp\left(x + \dfrac{x^2}{2}\right)$

C. $y = \tan\left(C + x + x^2\right)$

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

Answer: D

---

15. solution of the differential equation $xdy - ydx = \sqrt{x^2 + y^2}dx$ is

A. $x + \sqrt{x^2 + y^2} = Cx^2$

B. $y - \sqrt{x^2 + y^2} = Cx$

C. $x - \sqrt{x^2 + y^2} = Cx$

D. $y + \sqrt{x^2 + y^2} = Cx^2$

Answer: D

---

16. Integral curve satisfying $y' = \dfrac{x^2 + y^2}{x^2 - y^2}$, has the slope at the point

(1,0) of the curve equal to

A. $-5/3$

B. -1

C. 1

D. $5/3$

Answer: C

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17. The differential equation which represents the family of plane curves

$y = \exp(cx)$, is

    A. $y' = cy$

    B. $xy' - \log y = 0$

    C. $x \log y = yy'$

    D. $y \log y = xy'$

Answer: D

18. A continuously differentiable function $\phi(x) \in (0, \pi/2)$ satisfying $y' = 1 + y^2$, $y(0) = 0$, is

A. $\tan x$

B. $x(x - \pi)$

C. $(x - \pi)(1 - e^x)$

D. not possible

Answer: A

19. The solution of the differential equation $\dfrac{d^2y}{dx^2} = e^{-2x}$, is

A. $\dfrac{1}{4}e^{-2x}$

B. $\dfrac{1}{4}e^{-2x} + cx + d$

C. $\dfrac{1}{4}e^{-2x} + cx^2 + d$

D. $\dfrac{1}{4}e^{-2x} + c + d$

Answer: B

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20. The order and degree of the differential equation

$$\dfrac{d^2y}{dx^2} = \sqrt{1 + \left(\dfrac{dy}{dx}\right)^3}, \text{ is}$$

A. 2,2

B. 1,2

C. 2,3

D. 2,1

Answer: A

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21. 8 The solution of differential equation $\dfrac{dy}{dx} = \dfrac{y}{x} + \dfrac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

A. $\phi(y/x) = kx$

B. $x\phi(y/x) = k$

C. $\phi(y/x) = ky$

D. $y\phi(y/x) = k$

Answer: A

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22. The solution of the equation $\log\left(\dfrac{dy}{dx}\right) = ax + by$ is (a)

$(b)(c)(d)\dfrac{(e)(f)e^{(g)\ (h)\,by\,(i)}\,(j)}{k}b(l)(m) = (n)\dfrac{(o)(p)e^{(q)\ (r)\,ax\,(s)}\,(t)}{u}a(v)(w)$

(y)   (b)   *[Math   Processing   Error]*   (xx)   (c)

$(d)(e)(f)\dfrac{(g)(h)e^{(i)\ (j)\ -by\,(k)}\,(l)}{m}a(n)(o) = (p)\dfrac{(q)(r)e^{(s)\ (t)\,ax\,(u)}\,(v)}{w}b(x)($

(aa) (d) None of these

A. $\dfrac{e^{by}}{b} = \dfrac{e^{ax}}{a} + C$

B. $\dfrac{e^{-by}}{-b} = \dfrac{e^{ax}}{a} + C$

C. $\dfrac{e^{-by}}{a} = \dfrac{e^{ax}}{b} + C$

D. none of these

Answer: B

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23. $\tan^{-1} x + \tan^{-1} y = C$ is the general solution of the differential equation

A. $\dfrac{dy}{dx} = \dfrac{1+y^2}{1+x^2}$

B. $\dfrac{dy}{dx} = \dfrac{1+x^2}{1+y^2}$

C. $(1+x^2) dy + (1+y^2) dx = 0$

D. $\dfrac{dy}{dx} = \dfrac{1-y^2}{1-x^2}$

Answer: C

24. The solution of $ydx - xdy + 3x^2y^2e^{x^3}$ dx = 0 is

A. $\dfrac{x}{y} = x^3 + c$

B. $\dfrac{y}{x} = e^{x^3} + C$

C. $xy = e^{x^3} + C$

D. $xy = e^x + C$

Answer: A

25. The solution of the differential equaton

$$\dfrac{dy}{dx} = \dfrac{x\log x^2 + x}{\sin y + y\cos y}, \text{ is}$$

A. $y\sin y = x^2\log x + C$

B. $y\sin y = x^2 + C$

C. $y \sin y = x^2 + \log x + C$

D. $y \sin y = x \log x + C$

Answer: A

26. The solution of the differential equaiton

A. $\dfrac{dy}{dx} + y \tan x = \sec x,$ is

B. $y \sec x = \tan x + C$

C. $y \tan x = \sec x + C$

D. $\tan x = y \tan x + C$

Answer: A

27. The general solution of $e^x \cos y\, dx - e^x \sin y\, dy = 0$, is

A. $e^x(\sin y + \cos y) = C$

B. $e^x \sin y = C$

C. $e^x = C \cos y$

D. $e^x \cos y = C$

Answer: D

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28. The solution of the differential equation

$(2y - 1)dx - (2x + 3)dy = 0$, is

A. $\dfrac{2x - 1}{2y + 3} = C$

B. $\dfrac{2x + 3}{2y - 1} = C$

C. $\dfrac{2x - 1}{2y - 1} = C$

D. $\dfrac{2y + 1}{2x - 3} = C$

Answer: B

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29. The solution of $\dfrac{dy}{dx} + y = e^{-x}$, $y(0) = 0$, is

A. $y = e^{-x}(x - 1)$

B. $y = xe^{-x}$

C. $y = xe^{-x} + 1$

D. $y = (x + 1)e^{-x}$

Answer: B

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30. The solution of the differential equation $\dfrac{dy}{dx} = \dfrac{x + y}{x}$ satisfying the condition $y(1) = 1$ is (1) $y = \ln x + x$ (2) $y = x\ln x + x^2$ (3) $y = xe(x - 1)$ (4) $y = x\ln x + x$

A. $y = xe^{x-1}$

B. $y = x \ln x + x$

C. $y = \ln x + x$

D. $y = x \ln x + x^2$

Answer: B

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