MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

DIFFERENTIAL EQUATION

Practice Exercise Exercise 1

1. Order and degree of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + \sin y = 0$ are

A. order=1,degree =1

B. order=1,degree=not defined

C. order =2,degree=1

D. order =2,degree = not defined

Answer: c

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2. The order of the diferential equation whose general solution is given by

$y = c_1 e^{2x+c_2} + c_3 e^x + c_4 \sin(x + c_5)$ is

A. 5

B. 4

C. 3

D. 2

Answer: b

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3. Find the differential equation whose general solution is given by $y = (c_1 + c_2)\cos(x + c_3) - c_4 e^{x+c}$, where c_1, c_2, c_3, c_4, c_5 are arbitary constants.

A. 5

B. 6

C. 3

D. 2

Answer: c

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4. Order and degree of the differential equation $\left(\frac{ds}{dt}\right) + 3s\frac{d^2s}{dt^2} = 0$ are

A. order=2,degree=1

B. order=2,degree=4

C. order=1,degree=4

D. order=1,degree=1

Answer: a

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5. The number of arbitrary constants in the general solution of a differential equation of fourth order are: (A) 0 (B) 2 (C) 3 (D) 4

A. zero

B. 2

C. 3

D. 4

Answer: d

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6. The differential equation of the curve $y^2 = a\left(b^2 - x^2\right)$ representing the given family of curves, where a and b are constants, is

A. $yy' = x\left[(y'')^2 yy'\right]$

B. $yy' = x\left[(y')^2 + yy''\right]$

C. $yy' = \left[(y'')^2 + yy'\right]$

D. None of these

Answer: b

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7. The number of arbitrary constants in the particular solution of differential equation of third order is

A. 3

B. 2

C. 1

D. zero

Answer: d

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8. The differential equation of the curve $y = e^x(a\cos x + b\sin x)$ representing the given family of curves where a and b are costants , is

A. $y'' - 2y' + 2y = 0$

B. $y'' + 2y' - 2y = 0$

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

D. None of these

Answer: a

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

A. 1

B. 2

C. 3

D. 4

Answer: c

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10. The equation of family of a curve is $y^2 = 4a(x + a)$, then differential equation of the family is

A. $y = y' + x$

B. $y = y'' + x$

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

D. $y''y' + y^2 = 0$

Answer: a

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11. The differential equation whose general solution is given by $y = \left(c_1 \cos(x + c_2) - \left(c_3 e^{(-x+c4)} + (c_5 \sin x)\right.\right.$, where c_1, c_2, c_3, c_4, c_5 are arbitrary constants, is (a) $(b)(c)(d)\frac{(e)(f)d^{(g)4(h)}(i)y}{j}\left((k)d(l)x^{(m)4(n)}(o)\right)(p)(q) - (r)\frac{(s)(t)d^{(u)}}{x}$

(gg) (hh)

$(ii)(jj)(kk)\frac{(ll)(mm)d^{(nn)3(oo)}(pp)y}{qq}\left((rr)d(ss)x^{(tt)3(uu)}(vv)\right)(ww)(\times$

$+ (mmm)\frac{(nnn)dy}{ooo}((ppp)dx)(qqq)(rrr) + y = 0(sss)$

(ttt) (uuu)

$(vvv)(www)(\times x)\frac{(yyy)(zzz)d^{(aaaa)5(bbbb)}(cccc)}{dddd}\left((eeee)d(ffff)x^{(gggg)5(}\right.$

(mmmm) (nnnn)

$$(oooo)(pppp)(qqqq)\frac{(rrrr)(ssss)d^{(tttt)3(uuuu)}(vvvv)y}{wwww}\left((xxxx)d(yyyy)x^{(zzz}\right.$$

$$-(eeeee)\frac{(fffff)(ggggg)d^{(hhhhh)2(iiiii)}(jjjjj)y}{kkkkk}\left((lllll)d(mmmmm)x^{(nn}\right.$$

$$=0(yyyyy)$$

(zzzzz)

A. 6

B. 5

C. 4

D. 3

Answer: b

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12. The differential equation obtained by eliminating the arbitrary constants a and b from $xy = ae^x + be^{-x}$ is

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

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

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

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

Answer: a

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13. 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 the above

Answer: c

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14. The order of the differential equation whose solution is $ae^x + be^{2x} + ce^{3x} + d = 0$ is

A. $y''' - 6y'' + 11y' - 6y = 0$

B. $y''' + 6y'' + 11y' + 6y = 0$

C. $y'''6y'' - 11y' + 6y = 0$

D. $y''' - 6y'' - 11y' + 6y = 0$

Answer: c

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15. The particular solution of the differential equation $\cos\left(\frac{dy}{dx}\right) = a, (a \in R)$, satisfying the condition , y = 2 when x =0 is

A. $\cos\left(\frac{y+2}{x}\right) = a$

B. $\cos\left(\frac{x+2}{y}\right) = a$

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

D. $\cos\left(\frac{x-2}{y}\right) = a$

Answer: d

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16. Find the general solution of each of the following differential equations:

$$\frac{dy}{dx} = \frac{1-\cos x}{1+\cos x}$$

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

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

C. $y = 2\tan.\ \frac{x}{2} - x + c$

D. $y = 2\tan.\ \frac{x}{2} + x + c$

Answer: c

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17. The solution of the differential equation $\frac{dy}{dx} + y = 1(y \neq x)$ is

A. $y = ce^{x}$

B. $y = ce^{-x}$

C. $y = 1 + ce^{x}$

D. $y = 1 + ce^{-x}$

Answer: a

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18. Find the equation of the curve passing through the point $\left(0, \frac{\pi}{4}\right)$ whose differential equation is $s \in x \cos y \, dx + \cos x \, s \in y \, dy = 0$.

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

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

C. $\cos y = \frac{\sec x}{\sqrt{2}}$

D. $\cos y = \frac{\text{cosec}x}{\sqrt{2}}$

Answer: c

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19. The solution of $\frac{dy}{dx} = \frac{x^2 + y^2 + 1}{2xy}$ satisfying $y(1) = 0$ is given by

A. hyperbola

B. circle

C. ellipse

D. parabola

Answer: d

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20. Find the general solution of the differential equations $\left(e^{x}+e^{-x}\right)dy-\left(e^{x}-e^{-x}\right)dx=0$

A. $y=\log\left|e^{x}=e^{-x}\right|+C$

B. $y=\log.\left|\dfrac{e^{x}-e^{-x}}{e^{x}+e^{-x}}\right|+C$

C. $y=\log\left|e^{x}+e^{-x}\right|+C$

D. None of these

Answer: b

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21. The solution of $\dfrac{dy}{dx}=1+y+y^{2}+x+xy+xy^{2}$ is

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

B. $4\tan^{-1}\left(\dfrac{4y+1}{\sqrt{3}}\right)=\sqrt{3}\left(2x+x^{2}\right)+C$

C. $\sqrt{3}\tan^{-1}\left(\dfrac{3y+1}{3}\right)=4\left(1+x+x^{2}\right)+C$

D. $4\tan^{-1}\left(\frac{2y+1}{\sqrt{3}}\right) = \sqrt{3}(2x + x^2) + C$

Answer: a

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22. The solution of the differential equation

$\frac{dy}{dx} = e^{y+x} + e^{y-x}$ 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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23. The solution of the differential equation

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

A. $y = C(x + a)(1 - ay)$

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

C. $y = C(x - a)(1 + ay)$

D. None of these

Answer: d

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24. The solution of the differential equation

$\frac{dy}{dx} = e^{3x - 2y} + x^2 e^{-2y}$,is

A. $e^{2y} + e^{3x} + x^3 + C$

B. $\frac{1}{2}e^{2y} = \frac{1}{3}\left(e^{3x} + x^3\right) + C$

C. $\frac{1}{2}e^{2y} = \frac{1}{3}\left(e^{3x} + x^3\right) + C$

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

Answer: d

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25. The differential equation $(e^x + 1)ydy = (y + 1)e^x dx$ has the solution

A. $(y - 1)(e^x - 1) = Ce^y$

B. $(y - 1)(e^x + 1) = Ce^y$

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

D. $(y + 1)(e^x + 1) = Ce^y$

Answer: c

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26. A particular solution of $\log\left(\frac{dy}{dx}\right) = 3x + 4y, y(0) = 0$ is

A. $e^{3x} + 3e^{-4y} = 4$

B. $4e^{3x} - 3e^{-4y} = 3$

C. $3e^{3x} + 4e^{-4y} = 7$

D. $4e^{3x} + 3e^{-4y} = 7$

Answer: d

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27. The solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is

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

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

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

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

Answer: d

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28. The solution of the differential equation $\frac{dy}{dx} = \frac{xy + y}{xy + x}$ is

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

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

C. $x - y = \log\left(\frac{Cx}{y}\right)$

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

Answer: a

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

represents a

A. parabola

B. circle

C. hyperbola

D. straight line

Answer: b

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30. The solution of differential equation $(1+x)ydx+(1-y)xdy=0$ is

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

B. $\log_e\left(\frac{x}{y}\right)+x+y=C$

C. $\log_e\left(\frac{x}{y}\right)-x+y=C$

D. $\log_e(xy)-x+y=C$

Answer: a

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31. The solution of $\frac{dy}{dx} + \sqrt{\left(\frac{1-y^2}{1-x^2}\right)} = 0$is

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

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

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

D. None of these

Answer: b

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32. The solution of differential edquation $\frac{dy}{dx} + 1 = \cos ec(x+y)$ is

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

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

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

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

Answer: b

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33. The solution of the differential equation $\frac{dy}{dx}=x\log x$ is

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

B. $y=\frac{x^2}{x}\log x-\frac{x^2}{4}+C$

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

D. None of these

Answer: c

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34. The general solution of the differential equation

$$\frac{dy}{dx} = \frac{(1+y^2)}{xy(1+x^2)}$$ is

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

B. $(1+x^2)(1+y^2) = Cx^2$

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

D. $(1+x^2)(1+y^2) = Cy^2$

Answer: b

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35. The differential equation $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{y}$ 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. variables radii and a fixed centre at (0,1)

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

C. fixed radius 1 and variable centres along the X-axis

D. fixed radius 1 and variable centres along the Y -axis

Answer: b

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

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

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

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

D. None of the above

Answer: c

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37. The solution of differential equation

$ydx + \left(2\sqrt{xy} - x\right)dy = 0$ is

A. $\log|y| = \sqrt{\frac{x}{y}} = C$

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

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

D. None of these

Answer: b

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38. The solution of the differential equation

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

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

B. $\tan^{-1}\left(\frac{y}{x}\right) = 3\log x + C$

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

D. $\tan^{-1}\left(\frac{y}{x}\right) = 4\log x + C$

Answer: b

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39. solution of the differential equation $xdy - ydx = \sqrt{x^2 + y^2}dx$ is

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

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

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

D. None of these

Answer: b

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40. The solution of the differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$ is

A. $e^{y/x} = kx$

B. $e^{y/x} = ky$

C. $e^{x/y} = kx$

D. $e^{-y/x} = ky$

Answer: a

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41. The solution of the differential equation $\left(x^2 + y^2\right)dx = 2xydy$ is

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

B. $C\left(x^2 - y^2\right) = x$

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

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

Answer: b

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

A. $ay^2 = e^{x^2/y^2}$

B. $ay = ex^{x/y}$

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

D. $y = e^{x^2} + y^2 + C$

Answer: b

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

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

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

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

D. None of the above

Answer: a

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44. The solution of the differential equation $xy^2dy-\left(x^3+y^3\right)dx=0$ is

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

B. $y^3=3x^3\log(Cx)$

C. $y^3=3x^3+\log(Cx)$

D. $y^3+3x^3=\log(Cx)$

Answer: c

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45. The solution of the differential equation

$x(x-y)\frac{dy}{dx} = y(x+y)$, is

A. $\frac{x}{y} + \log(xy) = C$

B. $\frac{y}{x} + \log(xy) = C$

C. $\frac{x}{y} + y\log x = C$

D. $\frac{x}{y} + x\log y = C$

Answer: c

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46. Let y(x) be the solution of the differential equation $(x\log x)\frac{dy}{dx} + y = 2x\log x, (x \geq 1)$, Then y(e) is equal to

A. e

B. 0

C. 2

D. 2e

Answer: d

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47. The solution of the differential equation

$\frac{dy}{dx} = e^{x-y}(e^x - e^y)$ is

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

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

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

D. None of these

Answer: a

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48. The integrating factor of $x\frac{dy}{dx} + (1+x)y = x$ is

A. x

B. 2x

C. $e^{x\log x}$

D. xe^x

Answer: a

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49. The solution of $(x+y)\frac{dy}{dx} = 1$ is

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

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

C. $x + y - 1 = Ce^y$

D. $x + y - 1 = Ce^{-y}$

Answer: a

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50. The solution of differential equation $\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dx}{dy} = 1, (x \neq 0)$ is

A. $ye^{2\sqrt{x}} = 2\sqrt{x} + C$

B. $ye^{2\sqrt{x}} = 3\sqrt{x} + C$

C. $2ye^{2\sqrt{x}} = 3\sqrt{x} + C$

D. $ye^{\sqrt{x}} = 2\sqrt{x} = \ + C$

Answer: d

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51. solution of differential equation $x\cos x\frac{dy}{dx} + y(x\sin x + \cos x) = 1$ is

A. $xy = \sin x + C\cos x$

B. $xy + \cos x + C\sin x = 0$

C. $xy + \sec x + C\sin x = 0$

D. None of the above (where , C is arbitrary constant)

Answer: a

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52. What is the integrating factor of the differential equation $\left(1 - y^2\right)\frac{dx}{dy} = ay(-1 < y < 1)$?

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

B. $\frac{1}{\sqrt{y^2 - 1}}$

C. $\frac{1}{1 - y^2}$

D. $\frac{1}{\sqrt{1 - y^2}}$

Answer: a

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53. The solution of the differential equation $\frac{\left(x+2y^3\right)dy}{dx}=y$ is (a) $(b)(c)(d)\frac{x}{e}\left((f)(g)y^{(h)2(i)}(j)\right)(k)(l)=y+c(m)$ (n) (b) $(o)(p)(q)\frac{x}{r}y(s)(t)=(u)y^{(v)2(w)}(x)+c(y)$ (z) (c) $(d)(e)(f)\frac{(g)(h)x^{(i)2(j)}(k)}{l}y(m)(n)=(o)y^{(p)2(q)}(r)+c(s)$ (t) (d) $(u)(v)(w)\frac{y}{x}x(y)(z)=(aa)x^{(bb)2(cc)}(dd)+c(ee)$ (ff)

A. $x=y^3+Cy$

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

C. $x=2y^3+Cy$

D. $x=3y^3+Cy$

Answer: a

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54. The solution of differential equation

$$(x^2-1)\frac{dy}{dx}+2xy=\frac{1}{x^2-1}$$ is

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

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

C. $y(x^2+1)=\frac{1}{3}\log\left|\frac{x-1}{x+1}\right|+C$

D. $y(x^2-1)=\frac{1}{3}\log\left|\frac{x-1}{x+1}\right|+C$

Answer: d

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55. The solution of the differential equation

$$(1+y^2)dx=(\tan^{-1}y-x)dy$$ is

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

B. $y=\tan^{-1}y+1+Ce^{-\tan^{-1}y}$

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

D. None of the above

Answer: a

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56. Solution of the differential equation

$\left(1+x^2\right)dy+2xydx=\cot xdx$ is

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

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

C. $y=\log|\sin x|\left(1+x^2\right)+C(1+x)$

D. $y=\log|\sin x|\left(1+x^2\right)^{-1}$

Answer: c

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57. solution of the equation $\frac{dy}{dx} + \frac{1}{x}\tan y = \frac{1}{x^2}\tan y \sin y$ is

A. $2x = \left(1 - 2Cx^2\right)\sin y$

B. $x = \left(1 - 2Cx^2\right)\sin y$

C. $2x = \left(1 + 2Cx^2\right)\sin y$

D. None of these

Answer: d

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58. The general solution of the differential

$e^x dy + (ye^x + 2x)dx = 0$ is

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

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

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

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

Answer: d

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59. The solution of $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x$ is

A. $y \log x = \frac{1}{x}(1 + \log x) + C$

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

C. $y \log x = 2x(1 + \log x) + C$

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

Answer: c

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60. The solution of differential equation

$\cos x dy = y(\sin x - y)dx, 0 < x < \pi/2$ is

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

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

C. $y \sec x = \cot x + C$

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

Answer: c

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61. Find the general solution of the differential equations:`(dx)/(dy)+secx y=tanx(0lt=x

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

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

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

D. None of the above

Answer: c

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62. If the integrating factor of the differential equation

$\frac{dy}{dx} + P$ (x) y = Q (x) is x , then P (x) is

A. x

B. $x^2/2$

C. $1/x$

D. $1/x^2$

Answer: a

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63. The solution of $(x+y+1)\frac{dy}{dx}=1$ is

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

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

C. $x=-(y+2)+Ce^{y}$

D. $x=(y+2)^{2}+Ce^{y}$

Answer: c

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64. The solution of $\frac{dy}{dx}+y\tan x=\sec x$ is

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

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

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

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

Answer: a

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65. The solution of $\frac{dy}{dx} + y = e^x$ is

A. $2y = e^{2x} + C$

B. $2ye^x = e^2 + C$

C. $2ye^x = e^{2x} + C$

D. $2ye^{2x} = 2e^x + C$

Answer: d

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

A. $\frac{x}{\sin y} + \log x = C$

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

C. $\log x + x = C$

D. $\log x + y = C$

Answer: b

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67. The solution of the diffferential equation

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

A. $y = \frac{x^2 + C}{4x^2}$

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

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

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

Answer: b

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68. An integrating factor of the differential equation

$\left(1+y+x^2y\right)dx+\left(x+x^3\right)dy=0$ is

A. log x

B. x

C. e^x

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

Answer: a

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69. To reduce the differential equation $\frac{dy}{dx}+P(x)\cdot y=Q(x)\cdot y^n$ to the linear form , the substitution is

A. $v=\frac{1}{y^n}$

B. $v = \frac{1}{y^{n-1}}$

C. $v = y^n$

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

Answer: a

Watch Video Solution

70. The integrating factor of the differential equation $\frac{dy}{dx} + \frac{1}{x} \cdot y = 3x$ is

A. x

B. In x

C. 0

D. ∞

Answer: c

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71. The solution of the differential equation

$\frac{dy}{dx} + \frac{y}{x} = \sin x$ is

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

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

C. $x(y \cos x) = \sin x + C$

D. $x(y - \cos x) = \cos x + C$

Answer: a

Watch Video Solution

72. If $\frac{dy}{dx} + y = 2e^{2x}$, then y is equal to

A. $Ce^{x} + \frac{2}{3}e^{2x}$

B. $(1 - x)e^{-x} + \frac{2}{3}e^{2x} + C$

C. $Ce^{-x} + \frac{2}{3}e^{2x}$

D. $e^{-x} + \frac{2}{3}e^{2x} + C$

Answer: a

Watch Video Solution

73. The solution of dy = cos x $(2 - y \text{ cosec } x)dx$, where $y = \sqrt{2}, \quad \text{when} \quad x = \pi/4$ is

A. $y = \sin x + \frac{1}{2}\text{cosec}x$

B. $y = \tan(x/2) + \cot(x/2)$

C. $y = (1/\sqrt{2})\sec(x/2) + \sqrt{2}\cos(x/2)$

D. None of the above

Answer: b

Watch Video Solution

74. The solution of differential equation

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

A. $\frac{1}{x}=2-y^2+Ce^{-y^2/2}$

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

C. $\frac{2}{x}=1-y^3+e^{-y^2/3}$

D. None of these

Answer: a

Watch Video Solution

75. The solution of differential equation $\frac{dy}{dx}+xy=xy^2$ is

A. $-\frac{1}{y}=1+Ce^{x^2/2}$

B. $\frac{1}{y}=1+Ce^{x^2/2}$

C. $\frac{1}{y}=1-Ce^{x^2}$

D. None of the above

Answer: b

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76. The population of a village increases continuously at the rate proportional to the number of its inhabitants present at any time. If the population of the village was 20, 000 in 1999 and 25000 in the year 2004, what will be the population of the

A. 31250

B. 31251

C. 312510

D. 31350

Answer: b

Watch Video Solution

77. 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: a

Watch Video Solution

78. Water is dropped at the rate of $2m^2/s$ into a cone of semivertical angel of 45°. The rate at which periphery of water surface changes when height of water in the cone is 2 m, is

A. 2 m/s

B. 1m/s

C. 3 m/s

D. 4 m/s

Answer: a

Watch Video Solution

79. 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

Watch Video Solution

80. The equation of the curve satisfying the eqution $(xy - x^2)\frac{dy}{dx} = y^2$ and passing through the point $(-1, 1)$ is

A. $y = (\log y - 1)x$

B. $y = (\log y + 1)x$

C. $x = (\log x - 1)y$

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

Answer: b

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81. The slope at any point of a curve y = f(x) is given $\frac{dy}{dx} = 3x^2$ and it passes through (-1,1) . The equation the curve is

A. $y = x^3 + 2$

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

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

D. $y = -x^3 + 2$

Answer: a

Watch Video Solution

82. The equation of the curve passing through the point $\left(1, \frac{\pi}{4}\right)$ and having a slope of tangent at any point (x,y) as $\frac{y}{x} - \cos^2\left(\frac{y}{x}\right)$ is

A. $x = e^{1+\tan\left(\frac{y}{x}\right)}$

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

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

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

Answer: c

Watch Video Solution

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

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

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

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

D. None of these

Answer: a

Watch Video Solution

84. At present, a firm is manufacturing 2000 items. It is estimated that the rate of change of production P w.r.t. additional number of workers x is given by $\frac{dP}{dx} = 100 - 12\sqrt{x}.$ If the firm employs 25 more workers, then the new level of production of items is (1) 3000 (2) 3500 (3) 4500 (4) 2500

A. 2500

B. 3000

C. 3500

D. 4500

Answer: c

Watch Video Solution

85. The equation of the curve through the point (1,1) and whose slope is $\frac{2ay}{x(y-a)}$ is

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

B. $y^a . x^{2a} = e^y$

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

D. $y^a . x^a = e^y$

Answer: a

Watch Video Solution

Practice Exercise Exercise 2

1. The order of differential equation of all circles of given radius 'a' is

A. 1

B. 4

C. 3

D. 2

Answer: d

Watch Video Solution

2. The degree of the differential equation

$$x = 1\left(\frac{dy}{dx}\right) + \frac{1}{2!}\left(\frac{dy}{dx}\right)^2 + \frac{1}{3!}\left(\frac{dy}{dx}\right)^3 + \ldots..$$

A. 3

B. 2

C. 1

D. Not defined

Answer: c

Watch Video Solution

3. The order of the differential equation

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

A. 3

B. 2

C. 1

D. 4

Answer: b

Watch Video Solution

4. The differential equation representing the family of curves $y^2 = 2c\left(x + c^{2/3}\right)$, where c is a positive parameter, is of

A. order 3, degree 3

B. order2,degree4

C. order 1,degree 5

D. order 5,degree 1

Answer: c

Watch Video Solution

5. The order and degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/4} = \left(\frac{d^2y}{dx^2}\right)^{1/3}$

A. (2,4)

B. (2,3)

C. (6,4)

D. (6,9)

Answer: a

Watch Video Solution

6. The degree and order of the differential equation $y = px + \sqrt[3]{a^2p^2 + b^2}$, where $p = \frac{dy}{dx}$ are respectively

A. 3,1

B. 1,3

C. 1,1

D. 3,3

Answer: b

Watch Video Solution

7. The order and the degree of the differential equation $y = x\frac{dy}{dx} + \frac{2}{dy/dx}$ are

A. 1,2

B. 1,3

C. 2,1

D. 1,1

Answer: a

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8. The order and the degree of the differential equation $\sqrt{y + \frac{d^2y}{dx}} = x + \left(\frac{dy}{dx}\right)^{3/2}$ are

A. 2,2

B. 2,1

C. 1,2

D. 2,3

Answer: a

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9. The differential equation of the family of parabolas with focus at the origin and the X-axis as axis, is

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

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

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

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

Answer: b

Watch Video Solution

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

A. $xy' - y = 0$

B. $xy' + 2y = 0$

C. $xy' - 2y = 0$

D. $xy' + y = 0$

Answer: c

Watch Video Solution

11. The differential equation of the family of straight lines whose slope is equal to y - intercept ,is

A. $a\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$

B. $2a\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$

C. $2a\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3$

D. $a\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3 = 0$

Answer: b

Watch Video Solution

12. The differential equation of the family of straight lines whose slope is equal to y - intercept ,is

A. $(x+1)\frac{dy}{dx} - y = 0$

B. $(x+1)\frac{dy}{dx} + y = 0$

C. $\frac{dy}{Dx} = \frac{x+1}{y-1}$

D. $\frac{dy}{Dx} = \frac{x+1}{y+1}$

Answer: a

Watch Video Solution

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

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

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

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

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

Answer: a

Watch Video Solution

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

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

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

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

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

Answer: a

Watch Video Solution

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

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

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

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

Answer: c

Watch Video Solution

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

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

B. $\frac{dx}{dy}=0$

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

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

Answer: d

Watch Video Solution

17. Which of the following differential equation has $y = C_1 e^x + C_2 e^{-x}$ as the general solution ?

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

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

C. $\frac{d^2x}{dx^2} + 1 = 0$

D. $\frac{d^2y}{dx^2} - 1 = 0$

Answer: b

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18. Find a particular solution of the differential equation $(x \quad y) \quad (dx \quad + \quad dy) \quad = \quad dx \quad dy$, given that $y \quad = \quad 1$, when $x \quad = \quad 0$. (Hint: put $x \quad y \quad = \quad t$).

A. $\log|x - y| = x + y + 1$

B. $\log|x - y| = x - y - 1$

C. $\log|x-y| = x+y-1$

D. None of these

Answer: a

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19. Find the particular solution of the differential equation $\left(1+e^{2x}\right)dy + \left(1+y^2\right)e^x dx = 0$, given that $y=1$ when $x=0$.

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

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

C. $\tan^{-1} x + \tan^{-1} e^y = \frac{\pi}{4}$

D. $\tan^{-1} y + \tan^{-1} e^x = \frac{\pi}{3}$

Answer: a

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20. A continuously differentiable function $\phi(x)$ in $(0, \pi)$ satisfying $y' = 1 + y^2, y(0) = 0 = y(\pi)$ is

A. tan x

B. $x(x - \pi)$

C. $(x - \pi)(1 - e^x)$

D. not possible

Answer: d

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21. The solution of the differential equation $ydx - \left(x + 2y^2\right)dy = 0$ is $x = f(y)$. If $f(-1) = 1$, then $f(1)$ is equal to

A. 4

B. 3

C. 1

D. 2

Answer: b

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22. The solution of the differential eqution $\frac{d^2y}{dx^2} = e^{-2x}$ is $y = c_1e^{-2x} + c_2x + c_3$ where c_1 is

A. 1

B. $\frac{1}{4}$

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

D. 2

Answer: b

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23. The solution of the differential equation $e^{-x}(y+1)dy + \left(\cos^2 x - \sin 2x\right)y(dx) = 0$ subjected to the condition that y = 1 when x = 0 is

A. $y + \log y + e^x \cos^2 x = 2$

B. $\log(y+1) + e^x \cos^2 x = 1$

C. $y + \log y = e^x \cos^2 x$

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

Answer: a

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24. The solution of the differential equation $\frac{dy}{dx} = \frac{x - 2y + 1}{2x - 4y}$ is

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

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

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

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

Answer: a

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25. Form the differential equation of the family of circles in the first quadrant which touch the coordinate axes.

A. $(x-y)^2[1+(y')]=[x+yy']^2$

B. $(x-y)^2\left[1+(y')^2\right]=(x+yy')^2$

C. $(x+y)^2\left[1+(y')^2\right]=(x+yy')^2$

D. None of these

Answer: b

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

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

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

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

D. None of these

Answer: c

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27. From the differential equation by eliminating A and B in $Ax^2 + By^2 = 1$

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

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

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

D. None of the above

Answer: c

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28. If $x(t)$ is a solution of $\frac{(1+t)dy}{dx} - ty = 1$ and $y(0) = -1$ then $y(1)$ is (a) $(b)(c) - (d)\frac{1}{e}2(f)(g)(h)$ (i) (b) $(j)(k)e + (l)\frac{1}{m}2(n)(o)(p)$ (q) (c) $(d)(e)e - (f)\frac{1}{g}2(h)(i)(j)$ (k) (d) $(l)(m)(n)\frac{1}{o}2(p)(q)(r)$ (s)

A. 1

B. -1

C. $-\frac{1}{2}$

D. 0

Answer: c

Watch Video Solution

29. Find the differential equation of system of cocentric circles with centre (1,2)

A. $\frac{dy}{dx} = \frac{x-1}{x-2}$

B. $\frac{dy}{dx} = \frac{x-1}{2-x}$

C. $\frac{dy}{dx} = \frac{1-x}{2-y}$

D. $\frac{dy}{dx} = \frac{1-x}{y-2}$

Answer: d

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30. The solution of the differential equation

$$\left\{\frac{1}{x} - \frac{y^2}{(x-y)^2}\right\}dx + \left\{\frac{x^2}{(x-y)^2} - \frac{1}{y}\right\}dx = 0 \text{ is}$$

A. $In\left|\frac{x}{y}\right| + \frac{xy}{(x-y)} = C$

B. $In|xy| + \frac{xy}{(x-y)} = C$

C. $\frac{xy}{(x-y)} = Ce^{x/y}$

D. $\frac{xy}{(x-y)} = Ce^{xy}$

Answer: a

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31. 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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32. A curve $y = f(x)$ passes through point $P(1, 1)$. The normal to the curve at P is a $(y - 1) + (x - 1) = 0$. If the slope of the tangent at any point on the curve is proportional to the ordinate of the point, then the equation of the curve is (a) $(b)(c)y = (d)e^{(e)\,(f)K((g)\,(h)x-1(i))\,(j)}(k)(l)$ (m) (b) $(n)(o)y = (p)e^{(q)\,(r)Ke(s)}(t)(u)$ (v) (c) $(d)(e)y = (f)e^{(g)\,(h)K((i)\,(j)x-2(k))\,(l)}(m)(n)$ (o) (d) None of these

A. $y = e^{ax} - 1$

B. $y = e^{ax} + 1$

C. $y = e^{ax} + a$

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

Answer: d

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

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

B. $\frac{1}{2}$

C. 1

D. 0

Answer: a

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34. The equation of a curve passing through $\left(2,\frac{7}{2}\right)$ and having gradient $1-\frac{1}{x^2}$ 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

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35. The differential equation of the family of curves for which the length of the normal is equal to a constant k, is given by

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

B. $\left[y\frac{dy}{Dx}\right]^2 = k^2 - y^2$

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

D. $\left[y\frac{dy}{dx}\right]^2 = k^2 + y^2$

Answer: a

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36. The integrating factor of the differentiable equation

$(xy-1)\frac{dy}{dx}+y^2=0$ is

A. $\frac{1}{x}$

B. $\frac{1}{y}$

C. $\frac{1}{xy}$

D. xy

Answer: b

Watch Video Solution

37. The solution of the differential equation

$x^4\frac{dy}{dx}+x^3y+\text{cosec}(xy)=0$ is equal to

A. $2\cos(xy)+x^{-2}=C$

B. $2\cos(xy)+y^{-2}=C$

C. $2\sin(xy) + x^{-2} = C$

D. $2\sin(xy) + y^{-2} = C$

Answer: a

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38. The solution of differential equation $t = 1 + (ty)\frac{dy}{dt} + \frac{(ty)^2}{2!}\left(\frac{dy}{dt}\right)^2 + \ldots . \infty$ is

A. $y = \pm\sqrt{(\log t)^2 + C}$

B. $ty = t^y + C$

C. $y = \log t + C$

D. $y = (\log t)^2 + C$

Answer: a

Watch Video Solution

39. Form the differential equation of family of lines situated at a constant distance p from the origin.

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

B. $\left(x\dfrac{dy}{dx}-y\right)^2-p^2\left\{1+\left(\dfrac{dy}{dx}\right)^2\right\}=0$

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

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

Answer: b

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40. The solution of $\left(y-\dfrac{xdy}{dx}\right)=3\left(1-x^2\dfrac{dy}{dx}\right)$ is

A. $(y+3)(1-3x)=Cx$

B. $(y-3)=3xy+Cx$

C. $(y+3)(1+3x)=Cx$

D. $y + 3 = 3xy - Cx$

Answer: b

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41. The solution of the differential equation $ydx - xdy = xydx$ is

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

B. $2y = Cxe^{-x}$

C. $y = 3Cxe^{-x}$

D. $y^2 = Cxe^{-x}$

Answer: a

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42. A tangent and a normal to a curve at any point P meet the x and y axes at A, B and C, D respectively. Find the equation of the curve passing through $(1, 0)$ if the centre of circle through $O. C, P$ and B lies on the line y = x (where O is the origin).

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

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

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

D. $\frac{dy}{dx} + \frac{xy}{x + y}$

Answer: a

Watch Video Solution

43. The function $f(x)$ satisfying the equation $f^2(x) + 4f'(x)f(x) + (f'(x))^2 = 0$

A. $f(x) + 4f'(x). f(x) + [f'(x)]^2 = 0$

B. $f(x) = -C.e^{2+\sqrt{3}x}$

C. $f(x) = C.e^{\left(\sqrt{3}-2\right)x}$

D. $f(x) = C.e^{\left(2-\sqrt{3}\right)x}$

Answer: a

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44. Let y = f(x) be a curve passing through (e, e^e) which satisfy the differential equation

$(2ny + xy\log_e x)dx - x\log_e x dy = 0, x > 0, y > 0$

A. e

B. 1

C. 0

D. 2

Answer: c

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45. The solution of the differential equation $xy\frac{dy}{dx} = \frac{(1+y^2)(1+x+x^2)}{1+x^2}$ is:

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

B. $\sqrt{1-y^2} = Cxe^{\tan^{-1}x}$

C. $\sqrt{1+y^2} = Ce^{\tan^{-1}x}$

D. $\sqrt{1+y^2} = Cx$

Answer: a

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46. Find the equation of the curve such that the portion of the x-axis cut off between the origin and the tangent art a point is twice the abscissa and which passes through the point (1,2).

A. xy=1

B. xy=2

C. xy=3

D. xy=0

Answer: b

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47. The solution of the differential equation

$ye^{x/y}dx = \left(xe^{x/y} + y^2 \sin y\right)dy$ is

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

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

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

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

Answer: d

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48. The solution of the differential equation

$x\frac{dy}{dx} - y + x\sin\left(\frac{y}{x}\right) = 0$ is

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

B. $\left(1 - \cos.\frac{y}{x}\right) = C\sin\left(\frac{x}{y}\right)$

C. $x\left(1 - \cos.\frac{y}{x}\right) = C\sin\left(\frac{y}{x}\right)$

D. $\left(1 - \cos.\frac{y}{x}\right) = Cx\sin\left(\frac{y}{x}\right)$

Answer: c

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

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

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

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

D. None of the above

Answer: c

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50. Observe the following statement .

I . If $dy + 2xydx = 2e^{-x^2}dx$, then $ye^{x^2} = 2x + C$

II. If $ye^{x^2} - 2x = C$, then$dx = \left(2e^{-x^2}\right) - 2xy\Big)dy$

Which is/are correct statemant ?

A. Both I and II are true

B. Neither I nor II is true

C. I is true II is false

D. I is flse , II is true

Answer: c

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51. The solution of $x\frac{dy}{dx} = y + 2\sqrt{y^2 - x^2}$ is

A. $\frac{1}{2}In\left(\frac{y + \sqrt{y^2 - x^2}}{x}\right) = InCx$

B. $\frac{1}{2}In\left(\frac{y - \sqrt{y^2 - x^2}}{x}\right) = InCx$

C. $\frac{1}{2}In\left(y - \sqrt{y^2 - x^2}\right) = InCx$

D. $In\left(y - \sqrt{y^2 - x^2}\right) = InCx$

Answer: a

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52. Solution of $x\frac{dy}{dx} + y = x^2y^4$ is

A. $x^2y^2(3 + Cx) = 1$

B. $x^2y^3(3+Cx)=1$

C. $x^3y^3(3+Cx)=1$

D. $x^2y^3(3-Cx)=1$

Answer: b

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53. The solution of differential equation

$$\frac{dt}{dx}=\frac{t\left[\frac{d}{dx}\{g(x)\}\right]-t^2}{g(x)}$$ is

A. $t=\frac{g(x)+C}{x}$

B. $t=\frac{g(x)}{x}+C$

C. $t=\frac{g(x)}{x+C}$

D. $t=g(x)+x+C$

Answer: c

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54. The differential equation $y\frac{dy}{dx} + x = c$ represents

A. hyperbolas

B. parabolas

C. ellipses

D. circles

Answer: d

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55. 8 The solution of differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

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

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

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

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

Answer: a

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56. The general solution of $\frac{dy}{dx} = 2xe^{x^2-y}$ is

A. $e^{x^2-y} = C$

B. $e^{-y} + e^{x^2} = C$

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

D. $e^{x^2+y} = C$

Answer: c

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57. The solution of the differential equation

$$\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$$ is

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

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

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

D. None of these

Answer: a

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58. A solution of $y = 2x\left(\frac{dy}{dx}\right) + x^2\left(\frac{dy}{dx}\right)^4$ is

A. $y = 2\sqrt{C}x^{1/4} + C$

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

C. $y = 3\sqrt{C}(x + 3)$

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

Answer: d

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59. The solution of differential equation $\frac{dy}{dx} + xy = xy^2$ is

A. $y = 1 + Ce^{x^2/2}$

B. $\frac{1}{y} = 1 + Ce^{x^2/2}$

C. $\frac{1}{y} = 1 + Ce^{x/2}$

D. None of these

Answer: b

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60. Find the real value of m for which the substitution $y = u^m$ will transform the differential equation $2x^4 y\frac{dy}{dx} + y^4 = 4x^6$ in to a homogeneous equation.

A. m=0

B. m=1

C. $m = \frac{3}{2}$

D. $m = \frac{2}{3}$

Answer: c

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61. The solution of differential equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ is

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

B. $e^x = \frac{x^3}{3} + e^y + C$

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

D. None of these

Answer: c

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62. If $x^2 + y^2 = 1$ then $\left(y' = \frac{dy}{dx}, y'' = \frac{d^2y}{dx^2}\right)$

A. $yy'' - 2(y)^2 + 1 = 0$

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

C. $yy'' - (y')^2 - 1 = 0$

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

Answer: b

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63. $\frac{dy}{dx} + \frac{3x^2}{1+x^3}y = \frac{\sin^2 x}{1+x^3}$

A. $y\left(1+x^3\right)=x+\frac{1}{2}\sin 2x+C$

B. $y\left(1+x^3\right)=Cx+\frac{1}{2}\sin 2x$

C. $y\left(1+x^3\right)=Cx-\frac{1}{2}\sin 2x$

D. $y\left(1+x^3\right)=\frac{x}{2}-\frac{1}{4}\sin 2x+C$

Answer: d

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64. Solution of the differential equation $\frac{dy}{dx}+y\tan x=x^n\cos x$ is

A. $(m+1)y=x^{m+1}\cos x+C(m+1)\cos x$

B. $my=(x^m+C)\cos x$

C. $y=\left(x^{m+1}+C\right)\cos x$

D. None of the above

Answer: a

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65. The solution of differential equation

$(xy^5 + 2y)dx - xdy = 0,$ is

A. $9x^8 + 4x^9y^4 = 9y^4C$

B. $9x^8 - 4x^9y^4 - 9y^4C = 0$

C. $x^8(9 + 4y^4) = 10y^4C$

D. None of these

Answer: a

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66. The solution of the differential equation $\frac{dy}{dx} = \sin(x + y) + \cos(x + y)$ is:

A. $\log\left[1 + \tan\left(\frac{x + y}{2}\right)\right] + C = 0$

B. $\log\left[1 + \tan\left(\frac{x + y}{2}\right)\right] = x + C$

C. $\log\left[1-\tan\left(\frac{x+y}{2}\right)\right]=x+C$

D. None of the above

Answer: b

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67. The solution of the differential equation $x^4\frac{dy}{dx}+x^3y+\text{cosec}(xy)=0$ is equal to

A. $2\cos(xy)+x^{-2}=C$

B. $2\cos(xy)+y^{-2}=C$

C. $2\sin(xy)+y^{-2}=C$

D. $2\sin(xy)+y^{-2}=C$

Answer: a

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68. 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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69. 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

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70. Solve:

$$\frac{dy}{dx} = \frac{yf'(x) - y^2}{f(x)}$$

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

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

C. $f(x) = x + C$

D. None of these

Answer: b

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71. The solution of the differential equation $\frac{dy}{dx} = \frac{ax+g}{by+f}$ represents a circle when $a = b$ b. $a = -b$ c. $a = -2b$ d. $a = 2b$

A. a=b

B. $a = -b$

C. $a = -2b$

D. $a = 2b$

Answer: b

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72. The solution of the differential equation $\frac{dy}{dx} = \frac{ax+g}{by+f}$ represents a circle when $a = b$ b. $a = -b$ c. $a = -2b$ d. $a = 2b$

A. $e^x - e^{-\sin y} + \frac{x^3}{3} = C$

B. $e^{-x}e^{-\sin y} + \frac{x^3}{3} = C$

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

D. $e^x - e^{\sin y} - \frac{x^3}{3} = C$

Answer: c

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73. The solution of the differential of the differential equation

$\frac{dy}{dx} = \sin(x+y)\tan(x+y) - 1$ is

A. $\text{cosec}(x+y) + \tan(x+y) = x + C$

B. $x + \text{cosec}(x+y) = C$

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

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

Answer: b

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74. The solution of the differential equation

$(x+y)^2 \frac{dy}{dx} = a^2$ is

A. $(x+y)^2 = \frac{a^2 x}{2} + C$

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

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

D. None of these

Answer: d

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75. The solution of differential equation

$\cos x dy = y(\sin x - y)dx, 0 < x < \pi/2$ is

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

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

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

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

Answer: a

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76. The equation of one of the curves whose slope of tangent at any point is equal to $y + 2x$ is $y = 2(e^x + x - 1)$ $y = 2(e^x - x - 1)$ $y = 2(e^x - x + 1)$ $y = 2(e^x + x + 1)$ (5) $y = e^x - x - 1$

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

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

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

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

Answer: b

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77. The general solution of the differential equation $\frac{dy}{dx} + \frac{1+\cos 2y}{1-\cos 2x} = 0$ is given by

A. $\tan y \cot x = C$

B. $\tan y - \cot x = C$

C. $\tan x - \cot y = C$

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

Answer: b

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78. The solution of $\frac{dy}{dx} = \frac{ax+h}{by+k}$ represents a parabola when

A. a=0,b=0

B. a=1,b=2

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

D. a=2 , b = 1

Answer: c

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79. The solution of differential equation

$$\left[\frac{e^{-2\sqrt{2}}}{\sqrt{x}} - \frac{y}{\sqrt{xy}}\right]\frac{dx}{dy} = 1, (x \neq 0) \text{ is}$$

A. $ye^{2\sqrt{x}} = x + C$

B. $ye^{-2\sqrt{x}} = \sqrt{x} + C$

C. $y = \sqrt{x}$

D. $y = 3\sqrt{x}$

Answer: a

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80. The integrating factor of the differential equation $(y \log y)dx = (\log y - x)dy$ is

A. $\frac{1}{\log y}$

B. log(logy)

C. $1 + \log y$

D. logy

Answer: d

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

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

B. $y = x^2 + 2x + 2 - Ce^x$

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

D. $x = -y^2 - 2y - 2 + Ce^y$

Answer: d

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82. Integrating factor of the differential equation $(x.\log x)\frac{dy}{dx} + y = 2\log x$ is

A. e^x

B. log x

C. log(logx)

D. x

Answer: b

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83. Solution of the equation $x^2y - x^3\frac{dy}{dx} = y^4\cos x$, when y(0) =1 is

A. $y^3 = 3x^3\sin x$

B. $x^3 = 3y^3\sin x$

C. $x^3 = y^3\sin x$

D. $x^3 = y^3 \cos x$

Answer: b

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84. The solution of the differential equation $\left(1+y^2\right)+\left(x-e^{\tan^{-1}y}\right)\frac{dy}{dx}=0$ 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) $xe^{\tan^{-1}y}=\tan^{-1}y+k$

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

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

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

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

Answer: a

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85. The solution of the differential equation $\frac{dy}{dx} = \frac{x+y}{x}$ 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. $y = x\log x + x$

B. $y = \log x + x$

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

D. $y = xe^{x-1}$

Answer: a

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86. The integrating factor of the differential equation $\frac{dy}{dx} + \frac{y}{(1-x)\sqrt{x}} = 1 - \sqrt{x}$, is

A. $\frac{1+\sqrt{x}}{1-\sqrt{x}}$

B. $\frac{1-\sqrt{x}}{1+\sqrt{x}}$

C. $\frac{1-x}{1+x}$

D. $\frac{\sqrt{x}}{1-\sqrt{x}}$

Answer: b

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87. The solution of the differential equation $\frac{dy}{dx} - y\tan x = e^x \sec x$ is

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

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

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

D. $y\sin x = e^x + C$

Answer: b

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88. $(1+x^2)\frac{dy}{dx}+2xy=4x^2$, given that $y=0$, when $x=0$

A. $3x(1+y^2)=4y^3+C$

B. $3y(1+x^2)=4x^3+C$

C. $3x(1-y^2)=4y^3+C$

D. $3y(1+y^2)=4x^3+C$

Answer: b

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89. The solution of the differential equation $x\frac{dy}{dx}=2y+x^3e^x$, where y = 0 when x = 1 is

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

B. $y=x^3(e-e^x)$

C. $y=x^2(e^x-e)$

D. $y = x^2(e - e^x)$

Answer: c

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90. The solution of the differential equation

$\frac{dy}{dx} = y\tan x - 2\sin x$, is

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

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

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

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

Answer: b

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91. The family of curves $y = e^{a \sin x}$ where a is an arbitrary constant , is represented by the differential equation

A. $y \sin x = C + so \in 2x$

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

C. $y \cos x = C - \sin 2x$

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

Answer: d

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92. The differential equation of the family

$y = ae^x + bxe^x + cx^2 e^x$ of curves where, a,b,c are arbitrary constants is

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

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

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

D. $\log y = \cos x \frac{dy}{dx}$

Answer: b

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93. The order and degree of the differential equation of all tangent lines to the parabola $y = x^2$ is (a) 1,2 (b) 2,3 (c) 2,1 (d) 1,1

A. $y''' + 3y'' + 3y' + y = 0$

B. $y''' + 3y'' - 3y' - y = 0$

C. $y''' - 3y'' - 3y' + y = 0$

D. $y''' - 3y'' + 3y' - y = 0$

Answer: d

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94. The general solution of

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

A. 1

B. 2

C. 3

D. 4

Answer: a

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95. The general solution of the differential equation $\frac{dx}{dy} + \left(\frac{x}{y}\right)^2 - \left(\frac{x}{y}\right) + 1 = 0$ is

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

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

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

D. $\sin^{-1}\left(\frac{x}{y}\right) + \log y + C = 0$

Answer: a

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96. The general solution of the differential equaiton $\left(1+y^2\right)dx + \left(1+x^2\right)dy = 0$, 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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97. The solution of $\frac{dy}{dx} + 1 = e^{x+y}$ is

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

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

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

D. $e^{x+y} - x + C = 0$

Answer: a

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98. The differential equation $\frac{dy}{dx} = \frac{x(1+y^2)}{y(1+x^2)}$ represents a family of

A. parabola

B. hyperbola

C. circle

D. ellipse

Answer: b

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99. If $x \sin\left(\frac{y}{x}\right) dy = \left[y \sin\left(\frac{y}{x}\right) - x\right] dx a dy(1) = \frac{\pi}{2}$, then the value of $\cos\left(\frac{y}{x}\right)$ is equal to

A. x

B. 1/x

C. log x

D. e^x

Answer: c

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100. Solution of the differential equation $\tan y . \sec^2 x dx + \tan x . \sec^2 y dy = 0$ is

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

B. $\frac{\tan y}{\tan x} = C$

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

D. None of these

Answer: a

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101. The solution of $e^{dy/dx} = (x+1), y(0) = 3$ is

A. $y = (x+1)\log|x+1| - x + 3$

B. $y = (x+1)\log|x+1| + x + 3$

C. $y = (x+1)\log|x+1| + x + 3$

D. $y = \log x + x + 3$

Answer: b

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102. Solution of the differential equation

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

A. $x + y = a$

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

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

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

Answer: d

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103. If C is an arbitrary constant , then the general solution of the differential equation $ydx - xdy = xydx$ is given by

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

B. $y = Cye^{-x}$

C. $y + e^x = Cx$

D. $ye^x = Cx$

Answer: d

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104. Find the differential equation of system of cocentric circles with centre (1,2)

A. $(x-2) + (y-1)\frac{dy}{dx} = 0$

B. $(x-1) + (y-2)\frac{dy}{dx} = 0$

C. $(x+1)\frac{dy}{dx} + (y-2) = 0$

D. $(x+2)\frac{dy}{dx} + (y-1) = 0$

Answer: d

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105. If a curve passes through the point $\left(2, \frac{7}{2}\right)$ and has slope $\left(1 - \frac{1}{x^2}\right)$ at any point (x,y) on ity , then the ordinate of the point on the curve , whose abscissa is -2, is

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

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

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

D. $-\frac{5}{2}$

Answer: a

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106. The population p(t) at time t of a certain mouse species satisfies the differential equation $\left(dp\frac{t}{dt} = 0.5p(t) - 450 \text{ If } p(0) = 850\right.$, then the time at which the population becomes zero is (1) 2 ln 18 (2) ln 9 (3) $\frac{1}{2}$ ln 18 (4) ln 18

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

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

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

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

Answer: d

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107. The population p(t) at time t of a certain mouse species satisfies the differential equation $\left(dp\frac{t}{dt}=0.5p(t)-450\right.$ If $p(0)=850$, then the time at which the population becomes zero is (1) 2 ln 18 (2) ln 9 (3) $\frac{1}{2}$ ln 18 (4) ln 18

A. 2 log 18

B. log 9

C. $\frac{1}{2}\log 18$

D. log 18

Answer: a

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

A. 5

B. 13

C. -2

D. 7

Answer: d

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109. 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 $\left(dV\frac{t}{dt} = -k(T-t)\right.$, 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) $T^2 - \frac{1}{k}$ (2) $I - \frac{kT^2}{2}$ (3) $I - \frac{k(T-t)^2}{2}$ (4) e^{-kT}

A. $I - \frac{kT^2}{2}$

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

C. e^{-kT}

D. $T^2 - \frac{1}{k}$

Answer: a

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110. Find the equation of the curve in which the perpendicular from the origin on any tangent is equal to the abscissa of the point of contact.

A. The required differential equation is $y^2 - 2xy.\frac{dy}{dx} - x^2 = 0$

B. It is not homogeneous differential equation

C. The solution of the differential equation is $x^2 + y^2 = Cx$

D. The solution of the differential equation is $2x^2 + 3y^3 = Cxy$

Answer: c

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111. The volume of spherical balloon being inflated changes at a constant rate. If initially its radius is 3 units and after 3 seconds it is 6 units. Find the radius of balloon after t seconds.

A. $(63t + 27)^{1/3}$

B. $(27t + 63)^{1/3}$

C. $(27t + 9)^{1/3}$

D. $(9t + 63)^{1/3}$

Answer: a

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112. The order and degree of the differetnial equation $\sqrt{\sin x}(dx+dy)=\sqrt{\cos x}(dx-dy)$ are

A. (1,2)

B. (2,2)

C. (1,1)

D. (2,1)

Answer: c

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113. The equation of curve in which portion of y-axis cutoff between origin and tangent varies as cube of abscissa of point of contact is

A. $y=\frac{kx^3}{3}+Cx$

B. $y-\frac{kx^2}{2}+C$

C. $y = -\frac{kx^3}{2} + Cx$

D. $y = \frac{kx^3}{3} + \frac{Cx^2}{2}$

Answer: c

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114. A normal at any point (x,y) to the curve y = f(x) cuts triangle of unit area with the axes, the equation of the curve is :

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

B. $\frac{x}{y} = C$

C. xy=C

D. None of these

Answer: a

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Mht Cet Corner

1. Form the differential equation of the family of circles touching the y-axis at origin.

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

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

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

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

Answer: b

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2. The degree and order of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^3\right]^{\frac{7}{3}}=7\left(\frac{d^2y}{dx^2}\right)$ respectively are

A. 3 and 7

B. 3 and 2

C. 7 and 3

D. 2 and 3

Answer: b

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3. The particular solution of the differential equation $y(1+\log x)\frac{dx}{dy} - x\log x = 0, \quad \text{when} x = e, y = e^2$ is

A. $y = ex\log x$

B. $ey = x\log x$

C. $xy = e\log x$

D. $y\log x = ex$

Answer: a

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4. If sinx is the integrating facor (IF) of the linear differetnial equation $\frac{dy}{dx} + Py = Q$, then P is

A. log sin x

B. cos x

C. tan x

D. cot x

Answer: d

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5. Degree and order of the differential equation $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$ are respectively

A. 1,2

B. 2,1

C. 2,2

D. 1,1

Answer: a

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6. The order of the differential equation whose solution is $ae^x + be^{2x} + ce^{3x} + d = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: d

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7. The order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 - \left(\frac{dy}{dx}\right)^4}$ are respectively

A. 2,3

B. 3,2

C. 2,4

D. 2,2

Answer: a

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8. Write the order of the differential equation whose solution is $y = a\cos x + bs \in x + ce^{-x}.$

A. 3

B. 1

C. 2

D. 4

Answer: a

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

A. xy=C

B. $x + y = C$

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

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

Answer: a

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10. The solution of the differential equation $\sec x dy - \text{cosec} \quad y dx = 0$ is

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

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

C. $\sin y - \cos x = C$

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

Answer: b

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11. The differential equation obtained by eliminating a and b from $y = ae^{bx}$ is

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

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

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

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

Answer: c

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12. 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) $m = 3, n = 1$ (B) $m = 3, n = 3$ (C) $m = 3, n = 2$ (D) $m = 3, n = 5$

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

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

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

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

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

Answer: a

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14. The integrating factor of the differential equation $\frac{dy}{dx}\left(x(\log)_e x\right) + y = 2(\log)_e x$ is given by (a) $(b)x(c)$ (d) (b) $(e)(f)(g)e^{(h)x(i)}(j)(k)$ (l) (c) $(m)(n)(o)((p)\log)_q e(r)(s)x(t)$ (u) (d) *[Math Processing Error]* (ii)

A. e^x

B. log x

C. log(log x)

D. x

Answer: b

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

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

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

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

D. None of the above

Answer: b

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16. Find the differential equation of the family of circles whose centres lie on X-axis.

A. $\frac{d^2y}{(dx)^2} + \left(\frac{dy}{dx}\right)^2 + 1 = 0$

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

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

D. $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 1 = 0$

Answer: d

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17. The solution of the differential equation $y(1 + \log x)\frac{dx}{dy} - x\log x = 0$ is

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

B. $x\log x = yC$

C. $y(1 + \log x)C$

D. $\log x - y = C$

Answer: b

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18. General solution of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+y-1}$ is given by

A. $x + y = \log|x + y| + C$

B. $x - y = \log|x + y| + C$

C. $y = x + \log|x + y| + C$

D. $y = x\log|x + y| + C$

Answer: c

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19. Form of the differential equation of all family of lines $y = mx + \frac{4}{m}$ by eliminating the arbitrary constant m is

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

B. $x\left(\frac{dy}{dx}\right)^2 - y\frac{dy}{dx} + 4 = 0$

C. $x\left(\frac{dy}{dx}\right)^2 + y\frac{dy}{dx} + 4 = 0$

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

Answer: b

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

A. $y_2 = 2y_1 + x$

B. $y_3 = 2y_1$

C. $y_2^3 = y_1$

D. None of these

Answer: d

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21. Solution of the differential equation $\frac{dy}{dx}\tan y = \sin(x+y) + \sin(x-y)$ is

A. $\sec y + 2\cos c = C$

B. $\sec y - 2\cos x = C$

C. $\cos y - 2\sin x = C$

D. $\tan y - 2\sec y = C$

Answer: a

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22. Solution of $\frac{dy}{dx} = 3^{x+y}$ is

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

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

C. $3^{x-y} = C$

D. $3^x + 3^{-y} = C$

Answer: d

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23. The solution of the differential equation

$\frac{dy}{dx} = \frac{x - y + 3}{2(x - y) + 5}$ is

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

B. $2(x - y) - \log(x - y + 2) = x + C$

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

D. None of the above

Answer: c

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24. The solution of the differential equation

$(3xy + y^2)dx + (x^2 + xy)dy = 0$ is

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

B. $x^2(2xy - y^2) = C^2$

C. $x^2(y^2 - 2xy) = C^2$

D. None of the above

Answer: a

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25. An integrating factor of the differential equation

$x\frac{dy}{dx} + y\log x = xe^x x^{\frac{-1}{2}\log x}, (x > 0),$ is

A. $x^{\log x}$

B. $\left(\sqrt{x}\right)^{\log x}$

C. $\left(\sqrt{e}\right)^{(\log x)^2}$

D. e^{x^2}

Answer: c

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26. The solution of the differential equation $\left(1+y^2\right)\tan^{-1}x dx + y\left(1+x^2\right)dy = 0$ is

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

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

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

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

Answer: b

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

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

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

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

D. None of these

Answer: c

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