



## MATHS

### BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

### DIFFERENTIAL EQUATIONS

#### Solve Problem

1. The differential equation whose solution is  $y = ce^x$ , where  $c$  is an arbitrary constant, is

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

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

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

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

**Answer: B**



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2. The order and degree of the differential equation

$$\left[ \left( \frac{dy}{dx} \right)^2 + \left( \frac{d^2y}{dx^2} \right) \right]^{5/4} = k \frac{d^3y}{dx^3} \text{ is}$$

A. 1, 2

B. 2, 3

C. 3, 4

D. 4, 5

Answer: C



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3. The solution of  $\sqrt{1-x^2}dx + \sqrt{1-y^2}dy = 0$  is

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

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

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

D.  $\sinh^{-1}x + \sinh^{-1}y = c$

**Answer: A**



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**4. Solve the following differential equations.**

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

A.  $x^2 - y^2 - 2xy = 0$

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

C.  $x^2 - y^2 + 2xy = 0$

D.  $x^2 + y^2 + 2xy = 0$

**Answer: A**



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5. The equation of the curve passing through the origin and satisfying

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

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

B.  $2ye^x = e^x - 1$

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

D.  $2ye^{2x} = 2e^x + 1$

**Answer: C**



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6. If  $m, n$  are the order and degree of the differential equation

$$\left( \frac{d^4y}{dx^4} + \frac{d^2y}{dx^2} \right)^{3/2} = a \frac{d^3y}{dx^3} \text{ respectively, then } 2m + n =$$

A.  $\frac{11}{2}$

B. 7

C. 11

D.  $\frac{7}{2}$

**Answer: C**



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7. If  $e^{\frac{dy}{dx}} = x + 1$  and  $y = 3$  when  $x = 0$ , then  $y = (x + 1)\ln(x + 1) + f(x)$ , where  $f(x) =$

A.  $3 - x$

B.  $x - 3$

C.  $1 - x$

D.  $x - 1$

**Answer: A**



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8. The solution of  $y^3 \cos \sqrt{x} dx - \sqrt{x} e^{1/y^2} dy = 0$  is

A.  $e^{1/y^2} + 2 \sin \sqrt{x} = c$

B.  $e^{1/y^2} + 4 \sin \sqrt{x} = c$

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

D.  $e^{1/y^2} - 4 \sin \sqrt{x} = c$

**Answer: B**



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9. The solution of  $x \frac{dy}{dx} + y = y^2 x^3 \ln x$  is

A.  $\frac{x^2}{4}(2 \ln x - 1) + \frac{1}{xy} = c$

B.  $\frac{x^2}{4}(\ln x + 1) + \frac{1}{xy} = c$

C.  $\frac{x^2}{4}(2 \ln x + 1) + \frac{1}{xy} = c$

D.  $\frac{x}{4}(\ln x + 1) + \frac{1}{xy} = c$

**Answer: A**



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

$$y = (c_1 + c_2)\cos(x + c_3) - c_4e^{x+c_5} \text{ where } c_1, c_2, c_3, c_4, c_5 \text{ are}$$

arbitrary constant -

A. 5

B. 4

C. 3

D. 2

**Answer: C**



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11. The differential equation of co-axial system of circles

$$x^2 + y^2 - 4 + \lambda(2x + y - 5) = 0 \text{ is}$$

A.  $\left(2 + \frac{dy}{dx}\right)(x^2 + y^2 - 4) - \left(2x + 2y\frac{dy}{dx}\right)(2x + y - 5) = 0$

B.  $x^2 + y^2 - 4 + \frac{dy}{dx}(2x + y - 5) = 0$

C.  $x^2 + y^2 - 4 + \left(2 + \frac{dy}{dx}\right)(2x + y - 5) = 0$

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

**Answer: A**



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12. An integrating factor of the differential equation

$$\cos^2 x \frac{dy}{dx} - (\tan 2x)y = \cos^4 x \text{ is}$$

A.  $\frac{\cos x}{1 + \cos^2 x}$

B.  $\frac{\cos 2x}{1 + \cos^2 x}$

C.  $\frac{2 \cos^2 x}{\cos 2x}$



D.  $\frac{\cos 2x}{2 \cos^2 x}$

**Answer: D**



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## Exercise 1

1. The differential equation of the family of straight lines  $y = mx + a/m$  where  $m$  is the parameter, is

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

B.  $(x - y) \frac{dy}{dx} = a$

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

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

**Answer: D**



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2. From the differential equation by eliminating the arbitrary constant from the equations  $y = a(x - a)^2$

A.  $\left(\frac{dy}{dx}\right)^3 - 4xy\frac{dy}{dx} + 8y^2 = 0$

B.  $\left(\frac{dy}{dx}\right)^3 + 4xy\frac{dy}{dx} + 8y^2 = 0$

C.  $\left(\frac{dy}{dx}\right)^3 - 4xy\frac{dy}{dx} - 8y^2 = 0$

D.  $\left(\frac{dy}{dx}\right)^3 + 4xy\frac{dy}{dx} - 8y^2 = 0$

**Answer: A**



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3. If  $c$  is parameter then the differential equation whose solution is

$$y = c^2 + \frac{c}{x} \text{ is}$$

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

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

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

$$D. y = x^4 \left( \frac{d^2y}{dx^2} \right) - x \frac{dy}{dx}$$

**Answer: C**



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4. The differential equation whose solution is  $y^2 = 4ax$ , where  $a$  is an arbitrary constant, is

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

$$B. \frac{dy}{dx} = \frac{3y}{2x}$$

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

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

**Answer: A**



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5. Form the differential equation by eliminating the arbitrary constant

from the equation  $y = a \cos(2x + b)$

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

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

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

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

**Answer: A**



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6. The differential equation whose solution is  $y = ce^{-2x}$ , where  $c$  is an arbitrary constant, is

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

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

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

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

**Answer: C**



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7. Form the differential equation by eliminating the arbitrary constant

from  $y = A \cos 3x + B \sin 3x$

A.  $\frac{d^2y}{dx^2} + 9y = 1$

B.  $\frac{d^2y}{dx^2} + 9y = 0$

C.  $\frac{d^2y}{dx^2} - 9y = 0$

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

**Answer: B**



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8. Form the differential equation by eliminating the arbitrary constant from the equation  $y = a \cos x + b \sin x + x \sin x$

A.  $\frac{d^2y}{dx^2} + y = 3 \cos x$

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

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

D.  $\frac{d^2y}{dx^3} - y = 2 \cos x$

**Answer: C**



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9. The differential equation which represents the family of curves  $y = c_1 e^{c_2 x}$ , where  $c_1$  and  $c_2$  are arbitrary constants, is

A.  $y'' = y'$

B.  $yy'' = y'$

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

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

**Answer: C**



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10. The differential equation whose solution is  $y = Ae^{3x} + Be^{-3x}$ , where A, B are arbitrary constant, is

A.  $\frac{d^2y}{dx^2} = 9y$

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

C.  $\frac{d^2y}{dx^2} = 3y$

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

**Answer: A**



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11. The differential equation obtained by eliminating the arbitrary constant  $a$  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.  $x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} - y = 0$

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

**Answer: A**



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12. Form the differential equation by eliminating  $a$ ,  $b$  from  $y = ae^{3x} + be^{4x}$

A.  $\frac{d^2y}{dx^2} + 7 \frac{dy}{dx} + 12y = 0$

B.  $\frac{d^2y}{dx^2} - 7 \frac{dy}{dx} - 12y = 0$

C.  $\frac{d^2y}{dx^2} - 7 \frac{dy}{dx} + 12y = 0$



$$D. \frac{d^2y}{dx^2} + 7\frac{dy}{dx} + 12y = 0$$

**Answer: C**

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**13.** Form the differential equation by eliminating the arbitrary constant from the equation  $xy = ae^x + be^{-x} + x^2$

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

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

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

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

**Answer: A**

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14.  $y = Ae^x + Be^{2x} + Ce^{2x}$  satisfies the differential equation

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: A



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15. The differential equation of the family  $y = ae^x + bxe^x + vx^2e^x$  curves, where a, b, c are arbitrary constants, is :

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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**16.** Let  $p \in IR$ , then the differential equation of the family of curves

$y = (\alpha + \beta x)e^{px}$ , where  $\alpha, \beta$  are arbitrary constants, is

A.  $y'' + 4py' + p^2y = 0$

B.  $y'' - 2py' + p^2y = 0$

C.  $y'' + 2py' - p^2y = 0$

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

**Answer: B**



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**17.** Form the differential equation from  $ax^2 + by^2 = 1$

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

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

C.  $xyy_2 + xy_1^2 + yy_1 = 0$

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

**Answer: A**

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**18.** Form the differential equation by eliminating the arbitrary constant

from the equation  $x^2 + y^2 - 2ay - a^2 = 0$

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

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

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

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

**Answer: B**

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19. Form the differential equation by eliminating the arbitrary constant

from the equation  $x^2/a^2 + y^2/b^2 = 1$

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

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

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

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

**Answer: A**

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20. Form the differential equation by eliminating the arbitrary constant

from the equation  $x^2/a^2 - y^2/b^2 = 1$

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

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

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

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

**Answer: B**



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**21.** Form the differential equation by eliminating the arbitrary constant from the equation  $(y - b)^2 = 4(x - a)$

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

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

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

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

**Answer: C**



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22. Form the differential equation by eliminating a,b from

$$(x - a)^2 + (y - b)^2 = r^2$$

A.  $(1 - y_1^2)^3 = r^2 y_2^2$

B.  $(1 + y_1^2)^3 = r^2 y_2^2$

C.  $(1 + y_1^2)^3 = r_2 y^2$

D. none

**Answer: B**



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23. Form the differential equation by eliminating the arbitrary constant

from the equation  $y = ax^3 + bx^2$

A.  $x^2 \frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} - 6y = 0$

B.  $\frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} + 6y = 0$

$$\text{C. } x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 6y = 0$$

$$\text{D. } x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = 0$$

**Answer: D**



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**24.** Form the differential equation by eliminating the arbitrary constant

from the equation  $y = ax^2 + be^{-x}$

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

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

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

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

**Answer: C**



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25. Form the differential equation by eliminating the arbitrary constant

from the equation  $y = e^x(a \cos 2x + b \sin 2x)$

A.  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = 0$

B.  $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 5y = 0$

C.  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - 5y = 0$

D.  $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2\frac{dy}{dx} - 5y = 0$

**Answer: A**



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26. Form the differential equation by eliminating the arbitrary constant

from the equation  $y = e^{3x}(a \cos x + b \sin x)$

A.  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} - 10y = 0$

B.  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 10y = 0$

C.  $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 10y = 0$

$$D. \frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 6y = 0$$

**Answer: B**

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27. The differential equation of family of circles of fixed radius  $r$  and having their centres on  $y$ -axis is

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

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

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

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

**Answer: A**

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28. The differential equation of family of circles of fixed radius 5 units and centre on the line  $y = 2$  is

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

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

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

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

**Answer: B**



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29. The differential equation of all circles passing through the origin and having their centres on the x-axis is

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

B.  $x^2 = y^2 + 3xy \frac{dy}{dx}$

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

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

**Answer: C**



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**30.** The differential equation of family of curves  $x^2 + y^2 - 2ay = 0$  where 'a' is arbitrary constant is

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

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

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

D.  $2(x^2 + y^2)y' = xy$

**Answer: C**



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31. The differential equation of the family of parabolas having vertices at the origin and foci on y-axis is

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

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

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

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

**Answer: A**



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32. The differential equation of the family of parabola 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.  $y \left( \frac{dy}{dx} \right)^2 + y = 2x \frac{dy}{dx}$

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

**Answer: B**



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**33.** The differential equation of the family of parabola with vertex at  $(0,-1)$  and having axis along the  $y$ -axis is

A.  $xy' + y + 1 = 0$

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

C.  $xy' - y - 1 = 0$

D.  $yy' + 2xy + 1 = 0$

**Answer: B**



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34. The differential equation of the family of ellipses having centres at the origin and whose axes are the coordinate axes is

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

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

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

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

Answer: C



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35. The differential equation of the family of hyperbolas having centres at the origin and whose axes are the coordinate axes is

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

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

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

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

**Answer: C**



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36. The order of the differential equation  $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$  is

A. 1

B. 2

C. 3

D. 4

**Answer: B**



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37. The order of the differential equation  $\left( \frac{dy}{dx} \right)^3 + \left( \frac{dy}{dx} \right)^2 + y^4 = 0$  is



A. 4

B. 3

C. 1

D. 2

**Answer: C**



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38. The order of the differential equation  $\left(\frac{dy}{dx} + 3x\right)^{3/2} = x + 3\frac{dy}{dx}$  is

A. 1

B. 2

C. 3

D. 4

**Answer: A**



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39. The order of the differential equation

$$\frac{d^2y}{dx^3} + 2\left(\frac{dy}{dx}\right)^4 + \frac{dy}{dx} = \cos x \text{ is}$$

A. 3

B. 2

C. 4

D. 1

**Answer: B**



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40. The order of the differential equation  $\left[2 + \left(\frac{dy}{dx}\right)^2\right]^{-3/2} = a \frac{d^2y}{dx^2}$

is

A. 3

B. 2

C. 4

D. 1

**Answer: B**



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41. The order of the differential equation

$$\left[ \frac{d^2y}{dx^2} + \left( \frac{dy}{dx} \right)^2 \right]^{-3/2} = k \frac{d^2y}{dx^2} \text{ is}$$

A. 3

B. 2

C. 4

D. 1

**Answer: B**



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42. The degree and order of the differential equation of the family of all parabolas whose axis is x-axis, are respectively

A. 1, 2

B. 3, 2

C. 2, 3

D. 2, 1

**Answer: A**



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43. The degree and order of D.E. of the family of rectangular hyperbolas whose axis of symmetry are the coordinates axes

A. 1, 1

B. 1, 2

C. 2, 1

D. 2, 2

**Answer: A**



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44. The differential equation representing the family of curves  $y^2 = 2c(x + \sqrt{c})$ , where  $c > 0$  is a parameter, is of order and degree as follows.

A. order 1, degree 2

B. order 1, degree 1

C. order 1, degree 3

D. order 2, degree 2

**Answer: C**



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45. The differential equation whose solution is  $Ax^2 + By^2 = 1$ , where A and B are arbitrary constant is of

- A. first order and first degree
- B. second order and first degree
- C. second order and second degree
- D. first order and second degree

**Answer: B**



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46. The differential equation of the family of curve  $y = ax + \frac{1}{a}$ , where  $a \neq 0$  is an arbitrary constant, has the degree

- A. 4
- B. 3

C. 1

D. 2

**Answer: D**



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47. The solution of the differential equation  $ydx - xdy = 0$  is

A.  $y^2 = cx^3$

B.  $y = cx^2$

C.  $y = cx$

D.  $y^2 = cx$

**Answer: C**



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48. The solution of the differential equation  $ydx + xdy = 0$  is

A.  $xy = c$

B.  $x + y = c$

C.  $x - y = c$

D.  $x/y = c$

Answer: A



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49. The solution of the differential equation  $\frac{dy}{dx} - \frac{2xy}{1+x^2} = 0$  is

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

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

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

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



**Answer: A**



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50. The solution of  $\frac{dy}{dx} = \frac{2x}{3y^2}$  is

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

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

C.  $y^3 - 2x^2 = c$

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

**Answer: B**



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51. 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  $\frac{dV(t)}{dt} = -k(T - t)$ , where  $\hat{k} > 0$  is a constant

and  $T$  is the total life in years of the equipment. Then the scrap value  $V(t)$  of the equipment is

A.  $l - \frac{k(T - t)^2}{2}$

B.  $e^{-kt}$

C.  $T^2 - \frac{l}{k}$

D.  $l - \frac{kT^2}{2}$

**Answer: D**



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52. The population  $P(t)$  at time  $t$  of a certain mouse species satisfies the differential equation  $\frac{dp(t)}{dt} = 0.5p(t) - 450$ . If  $p(0) = 850$ , the time at which the population becomes zero is

A.  $\frac{1}{2} \ln 18$

B.  $\ln 18$

C.  $2 \ln 18$

D.  $\ln 9$

**Answer: C**



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**53.** 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

A. 3500

B. 4500

C. 2500

D. 300

**Answer: A**



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

- A.  $600 - 500e^{1/2}$
- B.  $400 - 300e^{-1/2}$
- C.  $400 - 300e^{1/2}$
- D.  $300 - 200e^{-1/2}$

**Answer: C**



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

- A. 13
- B. -2

C. 7

D. 5

**Answer: C**



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56. The solution of  $x^2 + y^2 \frac{dy}{dx} = 4$  is

A.  $x^2 + y^2 = 12x + c$

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

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

D.  $x^3 - y^3 = 12x + c$

**Answer: A**



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57. The solution of  $2xy \frac{dy}{dx} = 1 + y^2$  is

A.  $1 - y^2 = cx$

B.  $1 + y^2 = cx$

C.  $1x^2 = cy$

D.  $1 + x^2 = cy$

**Answer: B**



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58. The general solution of  $\frac{dy}{dx} + \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}} = 0$  is

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

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

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

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

**Answer: D**



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59. The solution of  $x^2 \frac{dy}{dx} = \sqrt{4 - y^2}$  is

A.  $\cos^{-1}(y/2) + 1/x = c$

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

C.  $\sin^{-1}(y/2) = 1/x = c$

D.  $\sin^{-1}(y/2) + 1/x = c$

**Answer: D**



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60. The general solution of  $\frac{dy}{dx} + \frac{\sqrt{1 - y^2}}{\sqrt{1 - x^2}} = 0$  is

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

B.  $\sinh^{-1} x - \sinh^{-1} y = c$

C.  $\tanh^{-1} x + \tanh^{-1} y = c$

D.  $\tanh^{-1} x - \tanh^{-1} y = c$

**Answer: A**



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61. The general solution of  $x\sqrt{1+y^2}dx + y\sqrt{1+x^2}dy = 0$  is

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

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

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

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

**Answer: B**



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62. The solution of  $x\sqrt{1-y^2}dx + y\sqrt{1-x^2}dy = 0$  is

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

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

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

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

Answer: C

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63. The solution of  $\sqrt{1+x^2}dx + \sqrt{1+y^2}dy = 0$  is

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

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

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

D.  $\sinh^{-1}x + \sinh^{-1}y = c$

Answer: A

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64. The solution of  $\frac{dy}{dx} + \frac{y^2 + y + 1}{x^2 + x + 1} = 0$  is

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

B.  $\frac{\tan^{-1}(2x + 1)}{\sqrt{3}} + \frac{\tan^{-1}(2y + 1)}{\sqrt{3}} = c$

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

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

Answer: B

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65. The solution of the differential equation  $\frac{dy}{dx} = \frac{xy + y}{yx + x}$  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: D**



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

A.  $2(x^3 - y^3) + 3(x^2 - y^2) = c$

B.  $2(x^3 - y^3) - 3(x^2 - y^2) = c$

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

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

**Answer: A**



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67. The solution of  $e^{x-y}dx + e^{y-x}dy = 0$  is

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

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

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

D.  $e^x - e^y = c$

**Answer: B**



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68. The solution of  $\frac{dy}{dx} = e^{2x-y} + x^3e^{-y}$  is

A.  $4e^y = 2e^{2x} - x^4 + c$

B.  $4e^y = 2e^{2x} + x^4 - x^2 + c$

C.  $4e^y = 2e^{2x} + x^4 + c$

D.  $4e^y = 2e^{2x} - x^4 + x^2 = c$

**Answer: C**



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**69.** The general solution of  $\tan y \sec^2 x dx + \tan x \sec^2 y dy = 0$  is

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

B.  $\tan x / \tan y = c$

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

D.  $\tan x - \tan y = c$

**Answer: C**



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**70.** If  $y = y(x)$  is the solution of the differential equation

$$\left( \frac{2 + \sin x}{y + 1} \right) \frac{dy}{dx} + \cos x = 0 \text{ with } y(0) = 1 \text{ then } y\left(\frac{\pi}{2}\right) =$$

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

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

C. 1

D.  $\frac{4}{3}$

**Answer: A**



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71. The solution of  $e^x \cot y dx + (1 - e^x) \cos e c^2 y dy = 0$  is

A.  $(e^x + 1) \cot y = c$

B.  $(e^x - 1) \cot y = c$

C.  $(2e^x - 1) \cot y = c$

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

**Answer: B**



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72. The solution of  $(e^x + 1)ydy + (y + 1)dx = 0$  is

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

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

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

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

**Answer: A**



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73. The solution of  $e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$  is

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

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

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

$$D. \cos y = c(1 - e)$$

**Answer: B**



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**74.** The solution of  $3e^x \cos^2 y dx + (1 + e^x) \cot y dy = 0$  is

A.  $\tan y = c(e^x - 1)^3$

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

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

D.  $\cos y = c(e^x - 1)^3$

**Answer: A**



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**75.** The solution of  $y dx - x dy + 3x^2 y^2 e^x dx = 0$  is



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

B.  $\frac{x}{y} - e^{x^3} = c$

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

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

**Answer: C**

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76. The solution of  $(x^2 - y^2x^2)\frac{dy}{dx} + (y^2 + x^2y^2) = 0$  is

A.  $x + \frac{1}{x} + y + \frac{1}{y} + c = 0$

B.  $x - \frac{1}{x} + y - \frac{1}{y} = c$

C.  $x + \frac{1}{x} - y - \frac{1}{y} + c = 0$

D.  $x - \frac{1}{x} - y - \frac{1}{y} = c$

**Answer: A**

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77. The solution of  $(xy^2 + x)dx + (yx^2 + y)dy = 0$  is

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

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

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

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

**Answer: C**



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78. The solution of  $x dx + y dy = x^2 y dy - x y^2 dx$  is

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

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

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

$$D. x^3 + 1 = c(1 - y^3)$$

**Answer: A**



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79. The solution of  $\frac{dy}{dx} = 2xy - 2y + 2x - 3$  is

A.  $e^{x^2+3x} = c(y + 1)$

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

C.  $e^{x^2-3x} = c(y - 1)$

D.  $e^{x^2-3x} = c(y + 1)$

**Answer: D**



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80. The solution of  $\frac{dy}{dx} + \frac{x(1+y^3)}{y^2(1+x^2)} = 0$  is

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

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

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

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

**Answer: A**

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81. The solution of  $(1 - x^2) \frac{dy}{dx} + xy = 5x$  is

A.  $y + 5 = c\sqrt{x^2 + 1}$

B.  $y + 5 = c\sqrt{x^2 - 1}$

C.  $y - 5 = c\sqrt{1 - x^2}$

D.  $y - 5 = c\sqrt{x^2 + 1}$

**Answer: C**

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82. The solution of  $(x^2y^3 + x^2) + (y^2x^3 + y^2)dy = 0$  is

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

B.  $(x^3 - 1)(y^3 - 1) = c$

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

D.  $(x^3 + 1)(y^3 - 1) = c$

**Answer: A**



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

A.  $-\frac{1}{xy} = c$

B.  $\log y = cx$

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

$$D. -\frac{1}{xy} + \log y = c$$

**Answer: D**



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$$84. dx + dy = (x + y)(dx - dy) \Rightarrow \log(x + y) =$$

A.  $x + y + c$

B.  $x + 2y + c$

C.  $x - y + c$

D.  $2x + y + c$

**Answer: C**



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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

A.  $y = x \ln x + x^2$

B.  $y = xe^{(x-1)}$

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

D.  $y = \ln x + x$

**Answer: C**



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86. 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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87. The solution of  $\frac{dy}{dx} = (x - y)^2$  is

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

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

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

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

**Answer: A**



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88. The solution of  $\frac{dy}{dx} = (3x + y + 4)^2$  is



A.  $3x + y - 4 = \sqrt{3} \tan(\sqrt{3}x + c)$

B.  $3x + y + 4 = \sqrt{3} \tan(x + c)$

C.  $3x + y = 4 = \sqrt{3} \tan(\sqrt{3}x + c)$

D.  $3x + y + 4 = \sqrt{3} \tan(2x + c)$

**Answer: C**

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**89.** The equation of the curve passing through the origin and satisfying the differential equation  $\frac{dy}{dx} = (x - y)^2$  is

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

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

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

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

**Answer: A**



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90. 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.  $x = (y + 2)^2 + ce^x$

**Answer: C**



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91. Solve  $\frac{dy}{dx} - x \tan(y - x) = 1$

A.  $ce^{x^2/2} = \sin(y - x)$

B.  $ce^{x^2/2} = \sin(y + x)$

C.  $ce^{x^2/2} = \sin(y - x)^2$

$$D. ce^{x^2/2} = \cos(y - x)$$

**Answer: A**



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$$92. \frac{dy}{dx} + 2x \tan(x - y) = 1 \Rightarrow \sin(x - y) =$$

A.  $Ae^{-x^2}$

B.  $Ae^{2x}$

C.  $Ae^{x^2}$

D.  $Ae^{-2x}$

**Answer: C**



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$$93. \text{The solution of } \frac{dy}{dx} = \sec(x + y) \text{ is}$$

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

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

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

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

**Answer: B**

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94. The solution of  $\frac{dy}{dx} = \tan^2(x + y)$  is

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

B.  $\sin(2x - 2y) = 2x - 2y + c$

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

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

**Answer: C**

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95. The solution of  $\tan y \frac{dy}{dx} = \sin(x + y) + \sin(x - y)$  is

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

B.  $\sec y = -2 \cos x + c$

C.  $\tan y = -2 \cos x + c$

D.  $\sec^2 y = -2 \cos x + c$

**Answer: B**



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96. The solution of the differential equation

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

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

B.  $x + \cos ec(x + y) = c$

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

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

**Answer: B**



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97. A particular solution of  $\frac{dy}{dx} = \frac{x(2 \log x + 1)}{\sin y + y \cos y}$  is

A.  $y \sin y = x \log x$

B.  $y^2 \sin y = x \log x$

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

D. none

**Answer: C**



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

A. a set of circles whose centres are on the x-axis

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

C. a set of parabolas

D. a set of ellipses

**Answer: A**



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**99.** If the subnormal at every point of a curve is a constant  $k$ , then its equation is

A.  $y^2 = kx$

B.  $y^2 = 2kx$

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

D. none

**Answer: C**

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**100.** The family of curves , in which the subtangent at any point to any curve is double the abscissa, is given by

A.  $x = cy^2$

B.  $y = cx^2$

C.  $x^2 = cy^2$

D.  $y = cx$

**Answer: A**

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**101.** The curve whose subtangent is twice the abscissa of the point of contact and passing through (1,2) is

A.  $y^2 = 4x$



B.  $y^2 = -4x$

C.  $x^2 = 4y$

D.  $x^2 = -4y$

**Answer: A**



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**102.** If the length of the subtangent at any point of a curve is constant ,  
then the curve is

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

B.  $y = be^{x/a}$

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

D. none

**Answer: B**



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**103.** The normal to a curve at  $P(x,y)$  meets the  $x$ -axis at  $G$ . If the distance of  $G$  from the origin is twice the abscissa of  $P$ , then the curve is a

- A. ellipse
- B. parabola
- C. circle
- D. hyperbola

**Answer: D**



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**104.** Equation of the curve passing through the point  $(4,3)$  and having slope  $= y/2$  at a point  $(x,y)$  on it is

A.  $\log\left(\frac{y}{3}\right) = \frac{x}{2} - 2$

B.  $\log\left(\frac{y}{3}\right) = \frac{x}{2} + 2$

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

D.  $y^2 = x + 5$

**Answer: A**



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**105.** The slope of a curve at any point on it is the reciprocal of twice the ordinate at that point. If the curve passes through (4,3) then its equation is

A.  $y^2 = x$

B.  $4y^2 + 9x$

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

D.  $y^2 = x + 5$

**Answer: D**



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106. The subnormal at any point of a curve is of constant length '8'. Then the differential equation of the family of curve is

A.  $\frac{dy}{dx} = 8y$

B.  $y \frac{dy}{dx} = 8$

C.  $y \sqrt{1 + \left(\frac{dy}{dx}\right)^2} = 8$

D.  $y \sqrt{1 + \left(\frac{dy}{dx}\right)^2} = 8 \frac{dy}{dx}$

**Answer: C**



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107. The equation of curve passing through (1,3) whose slope at any point (x,y) on it is  $y/x^2$  is given by

A.  $y = 3e^{-1/x}$

B.  $y = 3e^{1-1/x}$

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

D.  $y = 3e^{1/x}$

**Answer: B**



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**108.** The equation of curve passing through (0,1) which is a solution of differential equation  $(1 + y^2)dx + (1 + x^2)dy = 0$  is given by

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

B.  $\tan^{-1} x + \tan^{-1} y - \frac{\pi}{4} = 0$

C.  $\sin g^{-1} x + \sin g^{-1} = 0$

D.  $\sinh^{-1} x \sinh^{-1} y + \log(1 + \sqrt{2}) = 0$

**Answer: A**



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109. The equation of curve passing through ( ) satisfying the differential equation  $e^x \tan y dx + (1 + e^x) \sec^2 y dy = 0$  is given by

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

B.  $1 + e^x = 2 \tan y$

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

D.  $(1 + e^x) \tan y = k$

Answer: D



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110. The equation of curve passing through  $(\pi^2/4, 1)$ , which has a solution of the equation as  $y^2 \cos \sqrt{x} dx - 2\sqrt{x} e^{1/y} dy = 0$  is

A.  $\sin \sqrt{x} + e^{1/y} = e$

B.  $\sin \sqrt{x} - e^{1/y} = 1 - e$

C.  $\sin \sqrt{x} = 1 + e + e^{1/y}$

D.  $\sin \sqrt{x} + e^{1/y} = 1 + e$

**Answer: D**



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111. The solution of  $(x^2 + y^2)dx = 2xydy$  is

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

B.  $c(x^2 + y^2) = x$

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

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

**Answer: A**



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112. The solution of  $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$  is

A.  $x = ce^{2x^2/2y^2}$

B.  $y = ce^{2x^2/2y^2}$

C.  $y = ce^{x^2/2y^2}$

D.  $x = ce^{x^2/2y^2}$

**Answer: C**

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113. The solution of  $\frac{dy}{dx} = \frac{2xy}{x^2 - y^2}$  is

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

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

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

D.  $x^2 - y^2 = c/y$

**Answer: A**

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114. The solution of  $(x^2 - y^2)dx + 2xydy = 0$  is

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

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

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

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

**Answer: A**



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

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

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

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

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

**Answer: A**

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116. The solution of  $xdy - ydx = \sqrt{x^2 + y^2}dx$  is

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

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

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

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

**Answer: B**

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117. The solution of  $\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - 2xy}$  is

A.  $xy(y + x) = c$

B.  $xy(y - x) = c$

C.  $xy(x - y) = c$

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

**Answer: B**

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118. The solution of  $\frac{dy}{dx} = \frac{3x^2y - y^3}{3y^2x - x^3}$  is

A.  $x(y^3 - x^2y) = c$

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

C.  $x(y^3 + x^3) = c$

D.  $y(y^3 + x^3) = c$

**Answer: A**

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119. The solution of the differential equation  $xy^2 - (x^3 + y^3)dx = 0$  is

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

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

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

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

**Answer: B**



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120. The solution of  $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$  is

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

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

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

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

**Answer: B**



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121. The solution of  $\frac{dy}{dx} = \frac{(x+y)^2}{2x^2}$  is

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

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

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

D.  $\tan^{-1}\left(\frac{y}{x}\right) = \frac{1}{3}\log cx$

**Answer: A**



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122. The solution of  $x dx + y dy = 2(x dy - y dx)$  is

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

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

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

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

**Answer: C**



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**123.** The solution of  $\frac{dy}{dx} = \frac{x - y}{x + y}$  is

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

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

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

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

**Answer: A**



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124. The solution of  $\frac{dy}{dx} = \frac{2x - y}{2y - x}$  is

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

B.  $(y - x)(y + x)^3 = cx^4 e^{-4x}$

C.  $(y - x)(y - x)^3 = cx^4 e^{-4x}$

D.  $(y + x)(y - x)^3 = cx^4 e^{-4x}$

Answer: B



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125. The solution of the differential equation

$3xy' - 3y + (x^2 - y^2)^{1/2} = 0$ , satisfying the condition  $y(1) = 1$  is

A.  $3 \cos^{-1}\left(\frac{y}{x}\right) = \ln|x|$

B.  $3 \cos\left(\frac{y}{x}\right) = \ln|x|$

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

$$D. 3 \sin^{-1}\left(\frac{y}{x}\right) = \ln|x|$$

**Answer: A**



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**126.** The solution of the differential equation  $\frac{dy}{dx} = \frac{y}{x} + \frac{\varphi(y/x)}{\varphi'(y/x)}$  is

A.  $x\varphi\left(\frac{y}{x}\right) = k$

B.  $\varphi\left(\frac{y}{x}\right) = kx$

C.  $y\varphi\left(\frac{y}{x}\right) = k$

D.  $\varphi\left(\frac{y}{x}\right) = ky$

**Answer: B**



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**127.** The solution of  $\frac{dy}{dx} = \frac{y + x \tan^{-1} \frac{y}{x}}{x} \Rightarrow \sin^{-1} \frac{y}{x} =$



A.  $cx^2$

B.  $cx$

C.  $cx^3$

D.  $cx^4$

**Answer: B**

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128. Solve :  $xdy = \left( y + x \cos^2 \frac{y}{x} \right) dx$

A.  $\tan. \frac{y}{x} = \log(cx)$

B.  $\tan. \frac{y}{x} = \log(cy)$

C.  $\tan. \frac{x}{y} = \log(cx)$

D.  $\cos. \frac{y}{x} = \log(cx)$

**Answer: A**

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129. Solve :  $x \sin \frac{y}{x} \cdot \frac{dy}{dx} = y \sin \frac{y}{x} - x$

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

B.  $e^{\cos(y/x)} = cx$

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

D.  $e^{2y/2x} = cx$

**Answer: B**



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130. The solution of  $x \frac{dy}{dx} = y + xe^{y/x}$  with  $y(1) = 0$  is

A.  $e^{-y/x} m \log x$

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

C.  $e^{-y/x} + \log x = 1$

D.  $e^{y/x} + \log x = 1$

**Answer: C**



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**131.** The solution of the differential equation  $xy' = 2xe^{-y/x} + y$  is

A.  $e^{y/x} + \ln|ex| = 0$

B.  $e^{-y/x}x + e$

C.  $e^{y/x} = \ln|ax|$

D.  $e^{y/x} = 2\ln|ax|$

**Answer: D**



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**132.** The solution of  $(1 + e^{x/y})dx + e^{x/y}(1 - x/y)dy = 0$  is

A.  $ye^{y/x} + x = c$

B.  $ye^{x/y} - x = c$

C.  $ye^{x/y} + y = c$

D.  $ye^{x/y} + x = c$

**Answer: D**

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133. The solution of  $x \cos. \frac{y}{x}(ydx + xdy) = y \sin. \frac{y}{x}(xdy - ydx)$  is

A.  $cxy \cos(2y/x) = 1$

B.  $cxy \cos(x/y) = 1$

C.  $cxy \cos(y/x) = 1$

D.  $cxy \cos(y/x) = 2$

**Answer: C**

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

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

B.  $x \log\left(\frac{y}{x}\right) = cy$

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

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

Answer: C



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135. The solution of  $(12x + 5y - 9)dx + (dx + 2y - 4)dy = 0$  is

A.  $6x^2 + 5xy + y^2 + 9x + 4y = c$

B.  $6x^2 + 5xy + y^2 - 9x - 4y = c$

C.  $6x^2 - 5xy - y^2 - 9x - 4y = c$

D.  $3x^2 + 5xy + 2y^2 - 9x - 4y = c$

**Answer: B**



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136. The solution of  $\frac{dy}{dx} = \frac{x - 2y + 3}{2x - y + 5}$  is

A.  $x^2 - 4xy + y^2 + 6x - 10y = c$

B.  $x^2 - 4xy + y^2 - 9x - 4y = c$

C.  $x^2 + 4xy + y^2 + 6x - 10y = c$

D.  $x^2 - 4xy - y^2 - 6x - 10y = c$

**Answer: A**



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137. The solution of  $\frac{dy}{dx} = \frac{x + y + 1}{x + y - 1}$  is

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

B.  $e^{y-x} = c(x - y)$

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

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

**Answer: A**

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138. Solve  $\frac{dy}{dx} = \frac{x - 2y + 1}{2x - 4y}$

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

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

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

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

**Answer: B**

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139. The solution of the different equation

$$(2x - 4y + 3) \frac{dy}{dx} + (x - 2y + 1) = 0 \text{ is}$$

A.  $\log[(2x - 4y) + 3] = x - 2y + c$

B.  $\log[2(2x - 4y) + 3] = 2(x - 2y) + c$

C.  $\log[2(x - 2y) + 5] = 2(x + y) + c$

D.  $\log[4(x - 2y) + 5] = 4(x + 2y) + c$

Answer: D



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140. The solution of  $\frac{dy}{dx} = \frac{x + 7y + 2}{3x + 5y + 6}$  is

A.  $(y + x + 2)^4 = c(x + 5y + 2)$

B.  $(y - x + 2)^4 = c(x - 5y - 2)$

C.  $(y - x - 2)^4 = c(x + 5y + 2)$



$$D. (y - x - 2)^4 = c(x - 5y - 2)$$

**Answer: C**



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**141.** Solve the following differential equations.

$$\frac{dy}{dx} + \frac{10x + 8y - 12}{7x + 5y - 9} = 0$$

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

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

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

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

**Answer: B**



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142. The solution of  $(x + y + 1)dx + (3x + 4y + 4)dy = 0$  is

A.  $x - 2y - 2 = ce^{x / (2x + 4y + 4)}$

B.  $x + 2y - 3 = ce^{x / (2x + 4y + 4)}$

C.  $x + 2y + 2 = ce^{x / (2x + 4y + 4)}$

D.  $x - 2y + 2 = ce^{x / (2x + 4y + 4)}$

Answer: C



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143. The solution of  $(3y - 7x + 7)dx + (7y - 3x + 3)dy = 0$  is

A.  $(y - x' + 1)^2(y + x + 1)^5 = c$

B.  $(y - x + 1)^2(y - x - 1)^5 = c$

C.  $(y - x - 1)^2(y + x - 1)^5 = c$

D.  $(y - x + 1)^2(y + x - 1)^5 = c$

**Answer: D**



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**144.** The solution of  $\frac{dy}{dx} = \frac{x + 2y - 3}{2x + y - 3}$  is

A.  $x + y + 2 = c(x - y)^3$

B.  $x - y - 2 = c(x - y)^3$

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

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

**Answer: C**



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**145.** Integrating factor of  $\sin x \frac{dy}{dx} + y \cos x = \sin 2x$  is

A.  $\cos x$

B.  $\sin x$

C.  $-\sin x$

D.  $-\cos x$

**Answer: B**



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146. Integrating factor of  $\frac{dy}{dx} + \left( \frac{x \sin x + \cos x}{x \cos x} \right) y = \frac{1}{x \cos x}$  is

A.  $x \cos x$

B.  $x \sin x$

C.  $x \sec x$

D.  $x \operatorname{cosec} x$

**Answer: C**



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147. Integrating factor of  $\frac{dy}{dx} - \frac{2}{x+1}y = (x+1)^2$  is

A.  $\cos x$

B.  $\log \sec x$

C.  $\sec x$

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

**Answer: D**



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148. Integrating factor of the differential equation

$$(1-x^2)\frac{dy}{dx} + xy = \frac{x^4(\sqrt{1-x^2})^3}{(1+x^5)}$$
 is

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

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

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

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

**Answer: D**

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**149.** An integrating factor of the equation

$$(1 + y + x^2y)dx + (x + x^3)dy = 0 \text{ is}$$

A.  $e^x$

B.  $x^2$

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

D.  $x$

**Answer: D**

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150. The solution of  $\frac{dy}{dx} + \frac{3x^2y}{1+x^3} = \frac{\sin^2 x}{1+x^3}$  is

A.  $2y(1+x^3) = x + \sin x \cos x + c$

B.  $2y(1-x^3) = x + \sin x \cos x + c$

C.  $2y(1+x^3) = x - \sin x \cos x + c$

D.  $2y(1-x^3) = x - \sin x \cos x + c$

**Answer: C**



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151. The solution of  $(x^2 - 1) \frac{dy}{dx} + 2xy = 1$  is

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

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

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

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

**Answer: A**



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152. The solution of  $(x^2 + 1) \frac{dy}{dx} + 4xy = \frac{1}{x^2 + 1}$  is

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

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

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

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

**Answer: B**



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153. The solution of  $(1 + x^2) \frac{dy}{dx} + 2xy - 4x^2 = 0$  is

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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154. The solution of  $(1 - x^2) \frac{dy}{dx} + 2xy = x\sqrt{1 - x^2}$  is

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

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

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

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

**Answer: A**



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

A.  $ye^x = \cos x + c$

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

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

D.  $ye^x = \sin x + c$

**Answer: B**



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156. The solution of the differential equation  $\frac{dy}{dx} - 2y \tan 2x = e^x \sec 2x$

is

A.  $y \sin 2x = e^x + c$

B.  $y \cos 2x = e^x + c$

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

D.  $y \cos 2x + e^x = c$

**Answer: B**



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**157.** The solution of  $\cos^2 x \frac{dy}{dx} + y = \tan x$  is

A.  $ye^{\tan x} = (\tan x - 1)e^{\tan x} - \tan x + c$

B.  $ye^{\tan x} = (\tan x + 1)e^{\tan x} + c$

C.  $ye^{\tan x} = (\tan x - 1)e^{\tan x} + c$

D.  $ye^{\tan x} = (\tan x - 1)e^{\tan x} + \tan x + c$

**Answer: C**



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**158.** Solve the following differential equations.

$$x(x - 1) \frac{dy}{dx} - (x - 2)y = x^3(2x - 1)$$

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

B.  $y(x - 1) / x^2 = x^2 - x + c$

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

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

**Answer: A**

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159. The solution of  $\frac{dy}{dx} - \frac{xy}{1 - x^2} = \frac{1}{1 - x^2}$  is

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

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

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

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

**Answer: D**

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160. The solution of  $\frac{dy}{dx} + \frac{3x^2y}{1+x^3} = \frac{1+x^2}{1+x^3}$  is

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

B.  $y(1-x^3) = x + x^3/3 + c$

C.  $y(1+x^3) = x - x^3/3 + c$

D.  $y(1-x^3) = x + x^3/3 + c$

**Answer: A**



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161. The solution of  $\frac{dy}{dx} + \frac{xy}{1+x^2} = \frac{1}{x(1+x^2)}$  is

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

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

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

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

**Answer: B**



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162. The solution of  $x^2 \frac{dy}{dx} + (x-2)y = x^2 e^{-2/x}$  is

A.  $xye^{2/x} = x^2 + c$

B.  $xye^{2/x} = x^2/2 + c$

C.  $xy^2 e^{2/x} = x^2/2 + c$

D.  $2xye^{2/x} = x^2/2 + c$

**Answer: B**



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163. The solution of  $x \frac{dy}{dx} - y = 2x^2 \cos ec 2x$  is

A.  $\frac{y}{x} = -\log(\cos ec2x + \cot 2x) + c$

B.  $\frac{y}{x} = \log(\cos ec2x + \cot 2x) + c$

C.  $\frac{y}{x} = \log(\cos ec2x - \cot 2x) + x + c$

D.  $\frac{y}{x} = 2\log(\cos ec2x - \cot 2x) + c$

**Answer: A**



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

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

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

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

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

**Answer: C**



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165. The solution of  $\cos x \frac{dy}{dx} + y = \sin x$  is

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

**Answer: B**



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166. The solution of  $\frac{dy}{dx} + y \cos x = \sin x \cos x$  is

A.  $ye^{\sin x} = (\sin x - 1)e^{\sin x} - x + c$

B.  $ye^{\sin x} = (\sin x + 1)e^{\sin x} + c$

C.  $ye^{\sin x} = (\sin x - 1)e^{\sin x} + c$



$$D. ye^{\sin x} = (\sin x - 1)e^{\sin x} - x + c$$

**Answer: C**



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

$$A. yx^2 = \frac{x^4}{4} \log x - \frac{x^4}{16} + c$$

$$B. yx^2 = \frac{x^4}{4} \log x - \frac{x^4}{6} + c$$

$$C. xy^2 = \frac{x^4}{4} \log x - \frac{x^4}{26} + c$$

$$D. yx^2 = \frac{x^4}{4} \log x - \frac{x^4}{6} + c$$

**Answer: A**



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

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

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

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

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

**Answer: B**



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**169.** 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: C**



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170. The solution of  $ydx - xdy + \log x dx = 0$  is

A.  $y - \log x - 1 = cx$

B.  $x + \log y + 1 = cx$

C.  $y + \log x + 1 = cx$

D.  $y + \log x - 1 = cx$

Answer: C



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

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

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

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

$$D. x + y + 2 = ce^{2y}$$

**Answer: A**



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172. The differential equation  $\frac{dy}{dx} = \frac{1}{ax + by + c}$  where a,b,c are all non zero real numbers, is

- A. Linear in y
- B. Linear in x
- C. Linear in both x & y
- D. Homogeneous equation

**Answer: B**



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173. The solution of  $y^2 dx + (3xy - 1)dy = 0$  is

A.  $xy^3 = y^2 + c$

B.  $xy^3 = y^2 / 2 + c$

C.  $xy^3 = y^2 / 3 + c$

D.  $xy^3 = x^3 / 2 + c$

**Answer: B**



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174. The solution of  $dx + xdy = e^{-y} \sec^2 y dy$  is

A.  $xe^y = \sin y + c$

B.  $x^2 y^y = \tan y + c$

C.  $xe^y = \tan y - x + c$

D.  $xe^y = \tan y + c$

**Answer: D**



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175. The solution of  $\frac{dy}{dx} + \frac{3}{x}y = \frac{1}{x^2}$ , at  $y=2, x=1$

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

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

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

D.  $2x^3y = x^2 + 5$

**Answer: B**



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176. The solution of  $\frac{dy}{dx} + y \cot x = 4x \cos ecx$ , given that  $y = 0, x = \frac{\pi}{2}$

is

A.  $y \sin x = 2x^2 - \frac{\pi^2}{3}$

B.  $y \sin x = x^2 - \frac{\pi^2}{2}$

C.  $y \sin x = 2x^2 - \frac{\pi^2}{2}$

D.  $y \sin x = 2x^2 + \frac{\pi^2}{2}$

**Answer: C**

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177. The solution of  $\frac{dy}{dx} + 2y \tan x = \sin x$ , given that  $y = 0$ ,  $x = \frac{\pi}{3}$  is

A.  $y = \cos x - 2 \cos^2 x$

B.  $y = \cos x + 2 \cos^2 x$

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

D.  $y = 2 \cos x - 2 \cos^2 x$

**Answer: A**

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178. The solution of  $(x + 2y^3) \frac{dy}{dx} = y$  is

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

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

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

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

**Answer: B**



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179. Integrating factor of  $(x + 2y^3) \frac{dy}{dx} = y^2$  is

A.  $e^{(1/y)}$

B.  $e^{-(1/y)}$

C.  $y$



D.  $-1/y$

**Answer: A**



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**180.** The solution of the differential equation  $y' = \frac{1}{e^{-y} - x}$ , is

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

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

C.  $x = e^y(y + c)$

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

**Answer: A**



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**181.** The solution of  $\frac{dx}{dy} + \frac{x}{y} = x^2$  is

$$\text{A. } \frac{1}{y} = cx - x \log x$$

$$\text{B. } \frac{1}{x} = cy - y \log y$$

$$\text{C. } \frac{1}{x} = cx + x \log y$$

$$\text{D. } \frac{1}{y} = cx - y \log x$$

**Answer: B**



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**182.** The solution of  $(1 + y^2)dx = (\tan^{-1}y - x)dy$  is

$$\text{A. } xe^{\tan^{-1}y} = (\tan^{-1}y - 1)e^{\tan^{-1}y} + c$$

$$\text{B. } xe^{\tan^{-1}y} = (\tan^{-1}y - 1)e^{\tan^{-1}y} - x + c$$

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

$$\text{D. } x = (\tan^{-1}y + 1)e^{\tan^{-1}y} - x + y + c$$

**Answer: A**



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183. The solution of  $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{(1+x^2)^2}$ , is

A.  $y(1+x^2) = \tan^{-1} x - \pi/4$

B.  $y(1-x^2) = \tan^{-1} x - \pi/4$

C.  $y(1+x^3) = \tan^{-1} x + \pi/4$

D.  $x(1+x^2) = \tan^1 x - \pi/4$

**Answer: A**



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184. The solution of  $x \frac{dy}{dx} + y \log y = xye^x$  is

A.  $x \log y = (x+1)e^x + c$

B.  $\log y = (x-1)e^x + c$

C.  $(x-1)\log y = xe^x + c$

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

**Answer: D**



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**185.** The solution of  $\frac{dy}{dx} = e^{x-y}(e^x - e^y)$  is

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

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

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

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

**Answer: A**



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**186.** The solution of  $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$  is

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

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

C.  $\tan y = \frac{x^2}{2} - \frac{1}{2} + ce^{-x^2}$

D.  $\tan y = \frac{x^3}{2} - \frac{1}{3} + ce^{-x^2}$

**Answer: C**

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**187.** The solution of  $\cos y + (x \sin y - 1) \frac{dy}{dx} = 0$  is

A.  $\tan y - \sec y = cx$

B.  $\tan y + \sec y = cx$

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

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

**Answer: D**

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188. Solution of the 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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189. The solution of  $y'' + y' = 1$  is

A.  $y = x - ac^{-x} + b$

B.  $y = x + ac^x + b$

C.  $y + x = ac^{-x} + b$

$$D. y + x = ac^x + b$$

**Answer: A**



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**190.** The solution of  $y'' = y' \tan x = \sin x$  is

A.  $y = \frac{1}{2}(\sin x) + a \log(\sec x + \tan x) + b$

B.  $y = -\frac{1}{2}\sin x + a \log(\sec x + \tan x) + b$

C.  $y = \sin x + a \log(\sec x + \tan x) + b$

D.  $y = -\sin x + a \log(\sec x + \tan x) + b$

**Answer: B**



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

$$\text{A. } \frac{1}{xy} = \frac{-(\log x)^2}{4} + c$$

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

$$\text{C. } \frac{1}{xy} = \frac{-(\log x)^2}{2} + c$$

$$\text{D. } \frac{1}{xy} = \frac{-(\log x)^2}{3} + c$$

**Answer: C**



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$$192. x^2y - x^3 \frac{dy}{dx} = y^4 \cos x \Rightarrow x^3 y^{-3} =$$

A.  $\sin x$

B.  $2 \sin x + c$

C.  $3 \sin x + c$

D.  $3 \cos x + c$

**Answer: C**



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193. The solution of the differential equation

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

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

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

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

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

**Answer: A**



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194. The solution of  $\frac{dy}{dx} = 1 - x(y - x) - x^3(y - x)^3$  is

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

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

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

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

**Answer: D**

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195. The solution of  $\frac{1}{y^2} \frac{dy}{dx} + \frac{1}{xy} = 1$  is

A.  $\frac{1}{xy} = c + \log x$

B.  $\frac{1}{xy} = c \log x$

C.  $\frac{1}{xy} = c - \log x$

D.  $\frac{x}{y} = c - \log x$

**Answer: C**

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196. The solution of  $2y \frac{\cos y^2 (dy)}{dx} - \frac{2}{x+1} \sin y^2 = (x+1)^3$  is

A.  $\sin y^2 = (x+1)^2 \left[ (x+1)^2 + c \right]$

B.  $\sin y^2 = (x+1)^2 \left[ (x+1)^2 / 2 + c \right]$

C.  $\sin y^2 = (x+1)^2 \left[ (x+1)^3 / 3 + c \right]$

D.  $\sin y^2 = (x+1)^2 \left[ (x+1)^4 / 4 + c \right]$

Answer: B



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197. The solution of  $\frac{dy}{dx} + \frac{1}{x} = \frac{e^y}{x^2}$  is

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

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

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

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

**Answer: A**



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

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

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

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

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

**Answer: D**



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1. I: The differential equation for the family of curves  $x^2 + y^2 - 2ay = 0$ , where  $a$  is an arbitrary constant is  $(x^2 - y^2)y' = 2xy$

II: The differential equation of the family of parabolas having vertices at the origin and focus on  $y$ -axis is  $\frac{dy}{dx} = \frac{2y}{x}$

- A. only I is true
- B. only II is true
- C. both I and II are true
- D. neither I nor II true

**Answer: C**



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2. I: The solution of  $x^2 + y^2 \frac{dy}{dx} = 4$  is  $x^3 + y^3 = 12x + c$

II: The solution of  $2xy \frac{dy}{dx} = 1 + y^2$  is  $x^2 + y^2 = cx$

- A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: A**



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3. I: The solution of  $\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - 2xy}$  is  $xy(y - x) = c$

II: The solution of  $x dy = \left[ y + x \cos^2\left(\frac{y}{x}\right) \right] dx$  is  $\tan. \frac{y}{x} = \log(cx)$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: C**



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4. Which of the following statement is correct ?

Statement I if  $dy + 2xydx = 2e^{-x^2} dx$ , Then  $ye^{x^2} = 2x + c$

Statement II If  $ye^{x^2} - 2x = c$ , Then  $dx = (2e^{-x^2} - 2xy) dy$

A. both I and II are true

B. neither I nor II true

C. I is true, II is false

D. I is false, II is true

Answer: C



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5. If a, b, c are the orders of the differential equations

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

then the ascending order of a, b, c is

A. a, b ,c

B. b, c,a

C. c, a,b

D. b, a, c

**Answer: D**



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6. If a, b, c are the degrees of the differential equation

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

then the ascending order of a, b, c is

A. a, b ,c

B. b, c,a

C. a, c, b

D. b, a, c



**Answer: C**



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7. If the solution of  $\frac{dy}{dx} = \frac{x - y}{x + y}$  is  $ax^2 + bxy + cy^2 = k, k > 0$  then the ascending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, a, b

D. b, a, c

**Answer: B**



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## 8. Match the following

Given relation, arbitrary constant

I.  $y = a(x - a)^2, a$

II.  $y^2 = 4ax, a$

III.  $y = c e^{-2x}, c$

Differential equation

a)  $\frac{dy}{dx} + 2y = 0$

b)  $\frac{dy}{dx} = \frac{y}{2x}$

c)  $\left(\frac{dy}{dx}\right)^3 - 4xy \frac{dy}{dx} + 8y^2 = 0$

A. a,b,c

B. b, c,a

C. c, a,b

D. c, b, a

Answer: D



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## 9. Match the following

Differential equation

I.  $\sqrt{1+x^2} dx + \sqrt{1+y^2} dy = 0$

II.  $x\sqrt{1+y^2} dx + y\sqrt{1+x^2} dy = 0$

III.  $x\sqrt{1-y^2} dx + y\sqrt{1-x^2} dy = 0$

Solution

a)  $\sqrt{1+x^2} + \sqrt{1-y^2} = c$

b)  $\sqrt{1-x^2} + \sqrt{1-y^2} = c$

c)  $x\sqrt{1+x^2} + y\sqrt{1+y^2} + \text{Sinh}^{-1} x + \text{Sinh}^{-1} y = c$

A. a,b,c

B. b, c,a

C. c, a,b

D. c, b, a

**Answer: C**



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## 10. Match the following

### Differential equation

I.  $(xy^2 + x) dx + (yx^2 + y) dy = 0$

II.  $(x^2 y^2 + y^2) dx + (x^2 - x^2 y^2) dy = 0$

III.  $(x + xy^2) dx + (y - x^2 y) dy = 0$

### Solution

a)  $x^2 - 1 = c(1 + y^2)$

b)  $(x^2 + 1)(y^2 + 1) = c$

c)  $x + \frac{1}{x} + y + \frac{1}{y} + c = 0$

A. a,b,c

B. b, c,a

C. c, a,b

D. c, b, a

**Answer: B**



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### 11. Match the following

**Differential equation**

I.  $\frac{dy}{dx} - \frac{xy}{1-x^2} = \frac{1}{1-x^2}$

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

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

**Solution**

a)  $y(1+x^3) = x + \frac{x^3}{3} + c$

b)  $y\sqrt{1-x^2} = \text{Sin}^{-1}x + c$

c)  $y\sqrt{1+x^2} = \text{Sec}^{-1}x + c$

A. a,b,c

B. b, c,a

C. c, a,b

D. c, b, a

**Answer: B**



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12. Match the differential equation in List I to their integrating factors in

List II

**List I - Differential equation**

i)  $(x^3 + 1) \frac{dy}{dx} + x^2 y = 3x^2$

ii)  $x^2 \frac{dy}{dx} + 3xy = x^6$

iii)  $(x^3 + 1)^2 \frac{dy}{dx} + 6x^2 (x^3 + 1)y = x^2$

iv)  $(x^2 + 1) \frac{dy}{dx} + 4xy = \ln x$

**List II - Integrating factor**

a)  $x^3$

b)  $(x^3 + 1)^2$

c)  $(x^2 + 1)^2$

d)  $x^2 + 1$

e)  $(x^3 + 1)^{1/3}$

f)  $(x^3 + 1)^{1/2}$

The correct match is

A. (i) (ii) (iii) (iv)  
d a b c

B. (i) (ii) (iii) (iv)  
e a b c

C. (i) (ii) (iii) (iv)  
e b c f

D. (i) (ii) (iii) (iv)  
e a c d

**Answer: B**



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13. A: The number of arbitrary constants in the general solution of the differential equation  $x^2 d^2y/dx^2 + 2xdy/dx + y = 0$  is 2

R: The number of arbitrary constants in the general solution of a differential equation is equal to the order of the differential equation.

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

**Answer: A**



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14. Observe the following statements: A: Integrating factor of

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

R: Integrating factor of  $\frac{dy}{dx} + P(x)y = Q(x)$  is  $e^{\int P(x) dx}$

Then the true statement among the following is

A. A is true, R is false

B. A is false, R is true

C. A is true, R is true,  $\bar{R} \Rightarrow A$

D. A is false, R is false

**Answer: C**



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**15.** Observe the following statements:

A: Integrating factor of  $(x + 2y^3) \frac{dy}{dx} = y$  is  $\frac{1}{y}$

R: Integrating factor of  $\frac{dx}{dy} + P(y)x = Q(y)$  is  $e^{\int P(y) dy}$

Then the true statement among the following is

A. A is true, R is false

B. A is false, R is true

C. A is true, R is true,  $\bar{R} \Rightarrow A$

D. A is false, R is false

**Answer: C**



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