



MATHS

BOOKS - NCERT MATHS (HINGLISH)

DIFFERENTIAL EQUATIONS

Differential Equations

1. Find the solution of
$$\displaystyle rac{dy}{dx} = 2^{y-x}$$

2. Find the differential equation of all non-vertical

lines in a plane.

3. If
$$\frac{dy}{dx} = e^{-2y}$$
 and $y = 0$ when $x = 5$, then

the value of x for y=3 is

Watch Video Solution

4. Solve the following differential equation:

$$ig(x^2-1ig)rac{dy}{dx}+2xy=rac{1}{x^2-1};\,\,|x|\,
eq 1$$

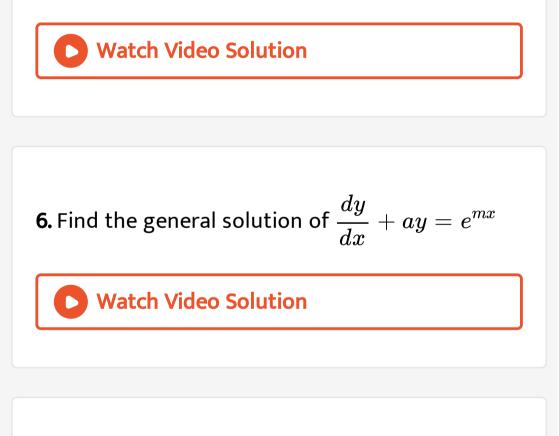
A.
$$y. (x^2 - 1) = \log\left(\frac{x - 1}{x + 1}\right) + K$$

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

Answer: D

5. Solution of
$$\frac{dy}{dx} + 2xy = y$$
 is (a)
 $(b)(c)y = c(d)e^e(f)x - (g)x^{((h)2(i))(j)(k)}(l)(m)$
(n) (b)

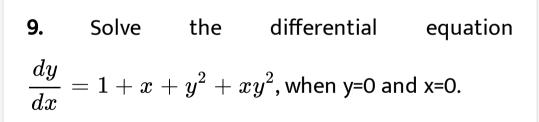
$$\begin{array}{l} (o)(p)y = c(q)e^{r}(s)(t)x^{(\,(\,u\,)\,2\,(\,v\,)\,)\,(\,w\,)\,-\,x\,(\,x\,)}\,(y)(z)\\ \\ \text{(aa)} \quad (c) \quad (d)(e)y = c(f)e^{(\,g\,)\,x\,(\,h\,)}\,(i)(j) \quad (k) \quad (d)\\ \\ (l)(m)y = c(n)e^{o}(p) - (q)x^{(\,(\,r\,)\,2\,(\,s\,)\,)\,(\,t\,)\,(\,u\,)}\,(v)(w)\\ \\ \text{(x)} \end{array}$$



7. Solve the following differential equation: $\frac{dy}{dx} + 1 = e^{x+y}$



8. Solve
$$ydx - xdy = x^2ydx$$
.



10. Find the general solution of
$$(x+2y^3)\frac{dy}{dx}=y$$

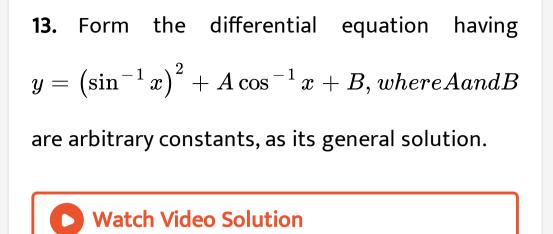
A. $x^2=y^3+Cy$
B. $x=y^2+Cy$
C. $2x=y^3+Cy$
D. $x=y^3+Cy$

Answer: D

11. If y(x) is a solution of the differential equation $\left(\frac{2+\sin x}{1+y}\right)\frac{dy}{dx} = -\cos x$ and y(0) = 1, then
find the value of $y\left(\frac{\pi}{2}\right)$.

Watch Video Solution

12. If
$$y(t)$$
 is a solution of $(1+t)rac{dy}{dx}-ty=1 and y(0)=-1$ then show that $y(1)=-rac{1}{2}$.



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

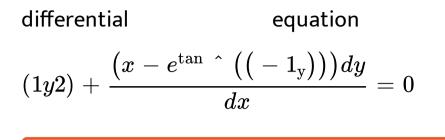
15. The equation of curve passing through origin and satisfying the differential equation $(1+x^2)\frac{dy}{dx} + 2xy = 4x^2$, is



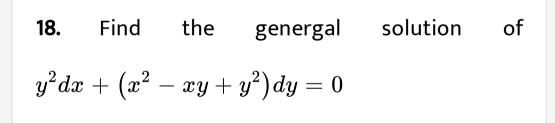
16. Solve the following differential equation: $rac{x^2 dy}{dx} = x^2 + xy + y^2$



17. Find the general solution of the following





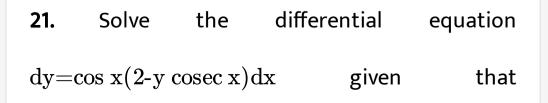


19. Solve the following differential equations:

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

Watch Video Solution

20. Solve
$$2(y+3) - xy \frac{dy}{dx} = 0$$
, given that $y(1) = -2$



y = 2, when
$$xd = \frac{\pi}{2}$$

Watch Video Solution
22. From the differential equation by eliminating
A and B in $Ax^2 + By^2 = 1$
Watch Video Solution
23. Solve the following differential equation:
 $(1 + y^2) \tan^{-1} dx + 2y(1 + x^2) dy = 0$

24. Find the differential equation of system of

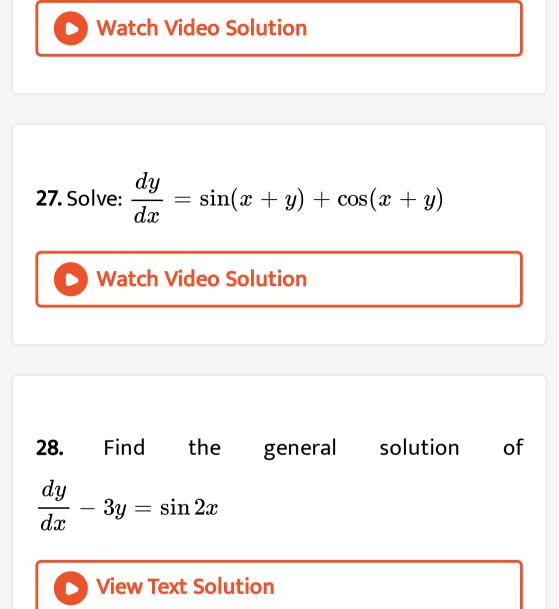
cocentric circles with centre (1,2)

Watch Video Solution

$$y+rac{d}{dx}(xy)=x(\sin x+\log x), f\in dy(x).$$

Watch Video Solution

26. Find the general solution of the differential equation $(1 + \tan y)(dx - dy) + 2xdy = 0$



29. The slope of the tangent at (x, y) to a curve passing through a point (2, 1) is $\frac{x^2 + y^2}{2xy}$, then

the equation of the curve is

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

B. $2ig(x^2+y^2ig)=3x$
C. $ig(x^2+y^2ig)=3x$
D. $ig(x^2+y^2ig)=2x$

Answer: A



30. Find the equation of the curve through the

point (1,0), if the slope of the tangent to the curve

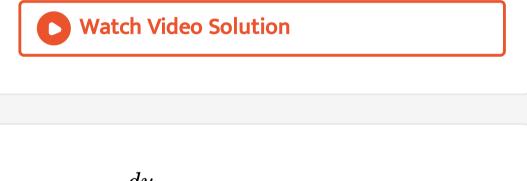
at any point (x,y) is $\displaystyle rac{y-1}{x^2+x}$

View Text Solution

31. Find the equation of the curve passing through origin if the slope of the tangent to the curve at any point (x, y)is equal to the square of the difference of the abscissa and ordinate of the point.



32. Find the eqution of the curve passing through the point (1,1), if the tangent drawn at any point P(x,y) on the curve meets the coordinate axes at A and B such that P is the mid point of AB.



33. Solve
$$x rac{dy}{dx} = y(\log y - \log x + 1)$$

34. The degree of the potential equation

$$\left(rac{d^2y}{dx^2}
ight)^2 + \left(rac{dy}{dx}
ight)^2 = x\sin\!\left(rac{dy}{dx}
ight)\!is$$

- A. 1
- B. 2
- C. 3
- D. not defined

Answer: D



35. The degree of the differential equation

$$\left[1+\left(rac{dy}{dx}
ight)^2
ight]^{3/2}=rac{d^2y}{dx^2} ext{is}$$

A. 4

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

C. not defined

Answer: D



36. The order and degree of the differential

 $rac{d^2 y}{dx^2} + \left(rac{dy}{dx}
ight)^{1/4} + x^{1/5} = 0$

respectively are

equation

A. 2 and 4

B. 2 and 2

C. 2 and 3

D. 3 and 3

Answer: A



37. If $y = e^{-x}(A\cos x + B\sin x)$ then y is a situation of

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

B. $\displaystyle rac{d^2y}{dx^2}-2rac{dy}{dx}+2y=0$
C. $\displaystyle rac{d^2y}{dx^2}+2rac{dy}{dx}+2y=0$
D. $\displaystyle rac{d^2y}{dx^2}+2y=0$

Answer:

38. The differential equation for $y = A \cos \alpha x + B \sin \alpha x$, where A and B are arbitary constant is

A.
$$\displaystyle rac{d^2y}{dx^2}-lpha.^2\,y=0$$

B. $\displaystyle rac{d^2y}{dx^2}+lpha.^2\,y=0$
C. $\displaystyle rac{d^2y}{dx^2}+lpha y=0$
D. $\displaystyle rac{d^2y}{dx^2}-lpha y=0$

Answer: B

39. The solution of differential equation xdy-ydx=0

represents

A. a reactangular hyperbola

B. parabola whose vertex is at orgin

C. straight line passing through origin

D. a circle whose centre is at origin

Answer: C



40. The integrating factor of differential equation

$$\cos x rac{dy}{dx} + y \sin x = 1$$
 is

A. cos x

B. tan x

C. sec x

D. sin x

Answer: C

41. The solution of differential equation
$$\cos x \frac{dy}{dx} + y \sin x = 1$$

A.
$$an x + an y = k$$

B.
$$an x - an y = k$$

$$\mathsf{C}.\,\frac{\tan x}{\tan y}=k$$

D.
$$an x$$
. $an y = k$

Answer: D

View Text Solution

42. The family $y = Ax + A^3$ of curves is represents by differential equation of degree A. 1 B. 2 C. 3 D. 4

Answer:



43. The integrating factor of

$$\frac{xdy}{dx} - y = x^4 - 3x$$
 is
A.x
B. log x
C. $\frac{1}{x}$
D. $-x$

Answer:



44. The solution of $\frac{dy}{dx} - y = 1, y(0) = 1$ is

given by

A.
$$xy = -e^x$$

$$\mathsf{B.}\,xy=\,-\,e^{\,-\,x}$$

$$C. xy = -1$$

D.
$$y = 2e^x - 1$$

Answer: D

45. The number of solution of $\frac{dy}{dx} = \frac{y+1}{x-1}$ when y(1) = 2 is

A. none

B. one

C. two

D. inifinite

Answer:

46. Which of the following is a second order differential equatoin

A.
$$\left(y'
ight)^2+x=y^2$$

$$\mathsf{B}.\,y'y'\,'+y=\sin x$$

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

D.
$$y^{\,\prime}\,=\,y^2$$

Answer:

47. The integrating factor of differential euation

$$ig(1-x^2ig)rac{dy}{dx}-xy=1 \mathrm{is}$$

A.
$$-x$$

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

D.
$$rac{1}{x} \mathrm{log}ig(1-x^2ig)$$

Answer: C

48. $an^{-1}x + an^{-1}y = C$ is general solution of

the differential equation

A.
$$\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$$

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

Answer:

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

A. family of hyperbolas

B. family of parabolas

C. family of ellipses

D. family of circles

Answer: D

50. The general solution of

$$e^x \cos y dx - e^x \sin dy = 0$$
 is
A. $e^x \cos y = k$
B. $e^x \sin y = k$
C. $e^x = k \cos y$
D. $e^x = k \sin y$

Answer:



51. The degree of differential equation

$$rac{d^2y}{dx^2} + \left(rac{dy}{dx}
ight)^3 + 6y^5 = 0$$
 is

- A. 1
- B. 2
- C. 3
- D. 5

Answer:

52. The solution of $rac{dy}{dx}+y=e^{-x},$ y(0)=0 is

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

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

$$\mathsf{C.}\, y = x e^{-x} + 1$$

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

Answer: B



53. The integrating factor of differential equation

 $rac{dy}{dx} + y an x - \sec x = 0$ is

A. cos x

B. sec x

 $\mathsf{C.}\, e^{\cos x}$

D. $e^{\sec x}$

Answer:

$$rac{dy}{dx} = rac{1+y^2}{1+x^2}$$
is

A.
$$y = an^{-1} x$$

B.
$$y=x=k(1+xy)$$

C.
$$x = an^{-1} y$$

D.
$$an(xy)=k$$

Answer:

55. The integrating factor of differential equation

$$rac{dy}{dx}+y=rac{1+y}{x} ext{is}$$

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

$$\mathsf{B.}\,\frac{e^x}{x}$$

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

D.
$$e^x$$

Answer: B

56. $y = ae^{mx} + b^{-mx}$ satisfies which of the

following differential equation?

A.
$$\displaystyle rac{dy}{dx} + my = 0$$

B. $\displaystyle rac{dy}{dx} - my = 0$
C. $\displaystyle rac{d^2y}{dx^2} - m^2y = 0$
D. $\displaystyle rac{d^2y}{dx^2} + m^2y = 0$

Answer:

57. The solution the differential equation

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

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

 $\mathsf{B.}\sin x \sin y = C$

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

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

Answer: B



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

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

B. $y=rac{e^x}{x}+rac{k}{x}$

$$\mathsf{C}.\, y = x e^x + k$$

D.
$$x=rac{e^y}{y}+rac{k}{y}$$

Answer: A



59. The differential equation of the family of curves of $x^2 + y^2 - 2ay = 0$ where a is arbitary constant, is

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

B. $2ig(x^2+y^2ig)rac{dy}{dx}=xy$
C. $2ig(x^2-y^2ig)rac{dy}{dx}=xy$
D. $ig(x^2-y^2ig)rac{dy}{dx}=2xy$

Answer:

60. The family $y = Ax + A^3$ of curves is represents by differential equation of degree A. 3

B. 2

C. 1

D. not defined

Answer:



61. The general solution of $rac{dy}{dx} = 2xe^{x^2-y}$ is

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

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

$$\mathsf{C}.\,e^y+e^{x^2}+C$$

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

Answer:



62. The curve for which the slope of the tangent at any point is equal to the ration of the abcissa to the cordinates of the point is

A. an ellipse

B. parabola

C. circle

D. rectangular hyperbola

Answer:

63. The general solution of differential equation

$$rac{dy}{dx}=e^{rac{x^2}{2}}+xy$$
 is

A.
$$y=Ce^{\,-\,x^2\,/\,2}$$

B.
$$y=Ce^{x^2\,/\,2}$$

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

D.
$$y=(C-x)e^{x^2/2}$$

Answer:



64. The solution of equation (2y-1)dx - (2x+3)dy = 0 is A. $\frac{2x-1}{2y+3} = k$ B. $\frac{2y+1}{2x-3} = k$

C.
$$rac{2x+3}{2y-1}=k$$

D.
$$rac{2x-1}{2y-1}=k$$

Answer: C

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

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

B. $\displaystyle rac{d^2y}{dx^2}-y=0$
C. $\displaystyle rac{d^2y}{dx^2}+(a+b)y=0$
D. $\displaystyle rac{d^2y}{dx^2}+(a-b)y=0$

Answer:

66. The solution of $rac{dy}{dx} + y = e^{-x}, y(0) = 0$ is

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

B.
$$y = xe^x$$

$$\mathsf{C}.\, y = x e^{-x} + 1$$

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

Answer: D



67. The order and degree of differential equation:

$$\left(rac{d^3y}{dx^3}
ight)^2 - 3rac{d^2y}{dx^2} + 2igg(rac{dy}{dx}igg)^4 = y^4 ext{are}$$

A. 1,4

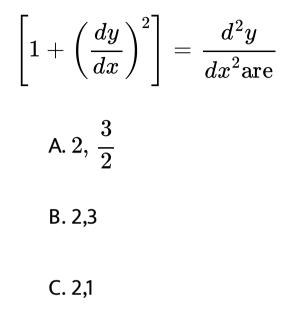
B. 3,4

C. 2,4

D. 3,2

Answer:

68. The order and degree of differential equation:



D. 3,4

Answer: C

69. The differential equation of family of curves of

$$y^2 = 4a(x+a)$$
is
A. $y^2 = 4rac{dy}{dx}igg(rac{x+dy}{dx}igg)$
B. $2yrac{dy}{dx} = 4a$
C. $rac{d^2y}{dx^2} + igg(rac{dy}{dx}igg)^2 = 0$
D. $2xrac{d^2y}{dx^2} + igg(rac{dy}{dx}igg)^2 - y = 0$

Answer:

70. Which of the following is a general solution of

$$rac{d^2y}{dx^2}-2rac{dy}{dx}+y=0$$

A. $y=(Ax+B)e^x$
B. $y=(Ax+B)e^{-x}$
C. $y=Ax^x+Be^{-x}$

D.
$$y = A \cos x + B \sin x$$

Answer: A

71. The general solution of $rac{dy}{dx} + y \tan x = \sec x$

is

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

- $\mathsf{B.} y \tan x = \sec x + C$
- $\mathsf{C}.\tan x = y\tan x + C$
- D. $x \sec x = \tan y + C$

Answer: A

72. The solution of differential equation
$$\frac{dy}{dx} + \frac{y}{x} = \sin x$$
 is

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

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

 $\mathsf{C.} xy \cos x = \sin x + C$

$$\mathsf{D}.\, x(y+\cos x)=\cos +C$$

Answer: B

73. The general solution of differential equation

$$\displaystyle rac{dy}{dx} = e^{rac{x^2}{2}} + xy$$
 is

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

B.
$$y + 1 = e^x + 1 + k$$

$$\mathsf{C}.\,y=\log\{(y+1)(e^x+1)\}$$

D.
$$y = \log \left\{ rac{e^x + 1}{y + 1}
ight\} + k$$

Answer:

74. The solution of differential equation

$$\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$$
is
A. $y = e^{x-y} - x^2 e^{-y} + C$
B. $e^y - e^x = \frac{x^3}{3} + C$
C. $e^x + e^y = \frac{x^3}{3} + C$
D. $e^x - e^y = \frac{x^3}{3} + C$

Answer: B

$$rac{dy}{dx}+rac{2xy}{1+x^2}=rac{1}{\left(1+x^2
ight)^2}$$
 is

A.
$$yig(1+x^2ig)=C+ an^{-1}x$$

B.
$$\displaystyle rac{y}{1+x^2} = C + an^{-1} x$$

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

D.
$$\left(1+x^2
ight)=C+\sin^{-1}x$$

Answer: A

76. (i) The degree of the differential equation

$$rac{d^2y}{dx^2}+e^{dy\,/\,dx}=0$$
 is...

(ii) The degree of the differential equation

$$\sqrt{1 + \left(rac{dy}{dx}
ight)^2} = {
m x} {
m is.....}$$

(iii) The number of arbitrary constant in the general solution of differential equation of order three is..

(iv)
$$\frac{dy}{dx} + \frac{y}{x\log x} = \frac{1}{x}$$
 is an equation of the

type....

(v) General solution of the differential equation of the type is givven by...

(vi) The solution of the differential

$$\frac{xdy}{dx} + 2y = x^{2} \text{ is....}$$
(vii) The solution of
$$(1 + x^{2})\frac{dy}{dx} + 2xy - 4xy^{2} = 0 \text{ is...}$$
(viii) The solution of the differential equation
$$ydx + (x + y)dy = 0 \text{ is}$$
(ix) Genergal solution of $\frac{dy}{dx} + y = \sin x \text{ is....}$
(x) The solution of differential equation cot y
$$dx = xdy \text{ is....}$$
(xi) The integrating factor of $\frac{dy}{dx} + y = \frac{1+y}{x}$
is.....

77. State True and False for the following

(i) Integrating factor of the differential of the form
$$rac{dx}{dy} + p_1 x = Q_1$$
 is given by $e^{\int P_1 dy}$.

(ii) Solution of the differential equation of the

type
$$rac{dx}{dy} + P_1 x = Q_1$$
 is given by $x \cdot IF = \int (IF) imes Q_1 dy.$ (iii) Correct

substitution for the solution of the differential equation of the type $\frac{dy}{dx} = f(x, y)$, where f(x, y) is homogeneous function of zero degree is y = vx.

(iv) Correct substitution for the solution of the differential equation of the type $\frac{dy}{dx} = g(x, y)$, where g(x, y) is a homogeneous function of the degree zero is x = vy.

(v) Number of arbitrary constants in the particular solution of a differential equation of order two is two.

(vi) The differential equation representing the family of circles $x^2 + (y-a)^2 = a^2$ will be of order two.

(vii) The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{1/3}$ is $y^{2/3} - x^{2/3} = c$ (viii) Differential equation representing the family of curve $y = e^x (A\cos x + B\sin x)$ is $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

(ix) The solution of the differential equation $rac{dy}{dx} = rac{x+2y}{x} ext{is} \;\; x+y = kx^2.$ Solution (x) of $rac{xdy}{dx} = y + x an rac{y}{x} ext{is} \quad ext{sin} \Big(rac{y}{x}\Big) = cx$ (xi) The differential equation of all non horizontal lines in a plane is $rac{d^2x}{du^2}=0.$ **View Text Solution**