



MATHS

BOOKS - ARIHANT PUBLICATION

DIFFERENTIAL EQUATION



1. Find the order and degree, if defined of each of the

following differential equation.

 $rac{dy}{dx} - \sec x = 0$

2. Find the order and degree, if defined of each of the

following differential equation.

$$y^{\prime}$$
''' $+y^2+e^{y^{\prime}}=0$

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3. Find the order and degree, if defined of each of the

following differential equation.

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

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4. Verify that the function $y = e^{-3x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 6y = 0$

5. Verify that $y = A \cos x + B \sin x$ is a solution of the

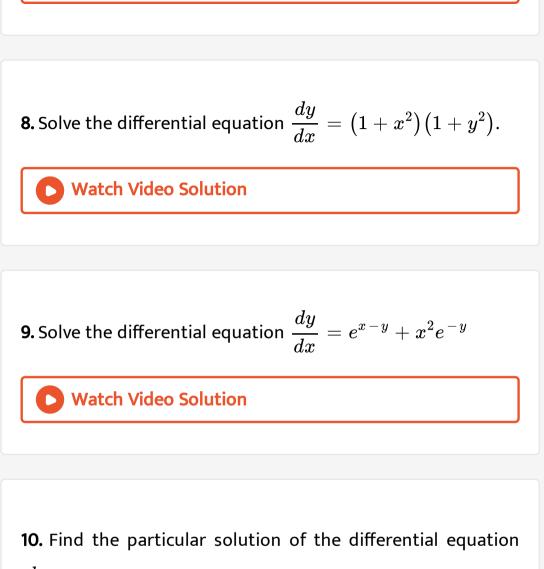
differential equation
$$\displaystyle rac{d^2 y}{dx^2} + y = 0$$

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6. Verify that the function $x + y = \tan^{-1} y$ is a solution of the differential equation $y^2y' + y^2 + 1 = 0$

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7. Find the differential equation of the family of curves $y = Ax + \frac{B}{x}$, where A and B are arbitary constants.



$$rac{dy}{dx}=~-~4xy^2$$
, given that y= 1, when x= 0.

11. Find the particular solution of the following differential equation: $\left(\frac{dy}{dx}\right) = \frac{1+y^2}{1+x^2}$ given that $y = \sqrt{3}$ when x = 1

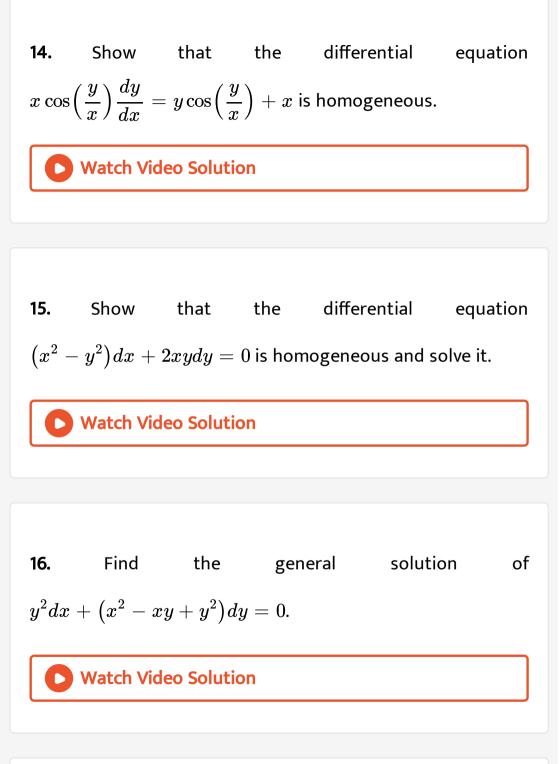
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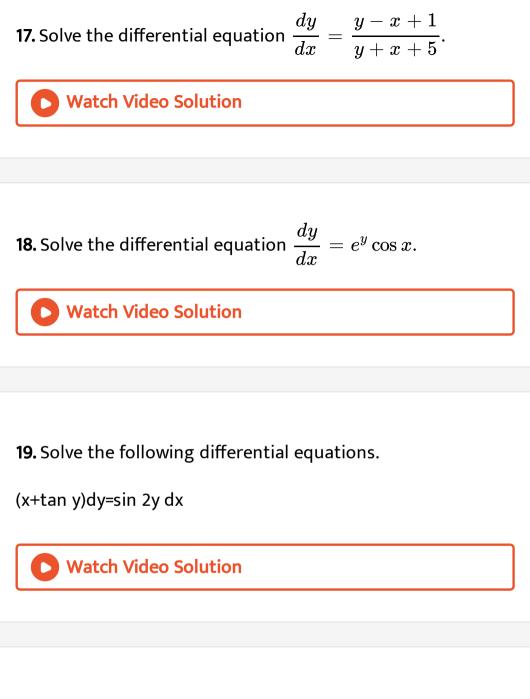
12. Solve
$$rac{d^2y}{dx^2}=6x+2.$$

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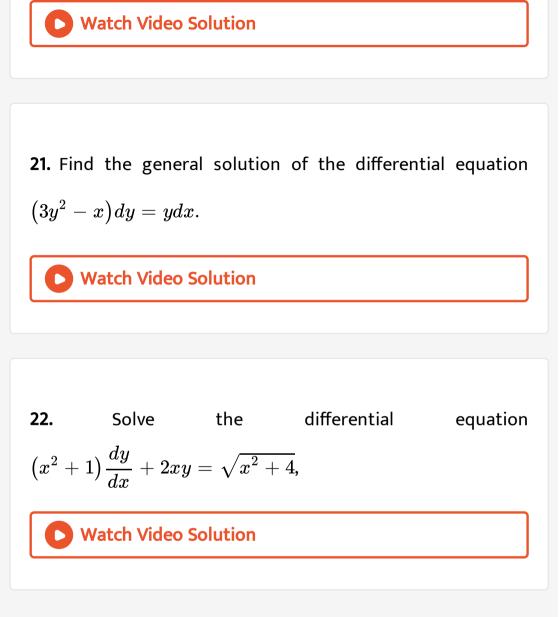
13. Solve the differential equation $rac{dy}{dx}+1=e^{x+y}$







20. Find the general solution of the following differential equation $e^{2x} \frac{dy}{dx} + 3e^{2x}y = 1$



Questions For Practice Of Part I Very Short Answer Type

1. Find the order and degree of each of the following

differential equations, if defined.

$$x igg(rac{d^3y}{dx^3} igg)^2 + igg(rac{dy}{dx} igg)^4 + y^2 = e^{-x}$$

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2. Find the order and degree of each of the following differential equations, if defined.

$$\left(rac{d^2y}{dx^2}
ight)^2+5xigg(rac{dy}{dx}igg)^4-6y=\log x$$

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3. Find the order and degree of each of the following differential equations, if defined.

$$xyiggl(rac{d^2y}{dx^2}iggr)^2+xiggl(rac{dy}{dx}iggr)-yiggl(rac{dy}{dx}iggr)=0$$

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4. Find the order and degree of each of the following differential equations, if defined.

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

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5. Find the order and degree of each of the following differential equations, if defined.

$$\left(rac{d^2y}{dx^2}
ight)^3+x\left(rac{dy}{dx}
ight)^2+\sin\!\left(rac{dy}{dx}
ight)+1=0$$

6. Find the order and degree of each of the following

differential equations, if defined.

$$\left(rac{d^2y}{dx^2}
ight)+\cos\!\left(rac{dy}{dx}
ight)=0$$

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7. Find the order and degree of each of the following differential equations, if defined.

$$\log_e\!\left(1+rac{d^2y}{dx^2}
ight)=x.$$

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8. Find the order and degree of each of the following differential equations, if defined.

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

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9. Write the order of the differential equation of the family of

circles $ax^2 + ay^2 + 2gx + 2fy + c = 0$.

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10. Write the order of the differential equation of the system

of ellipse
$$rac{x^2}{a^2}+rac{y^2}{b^2}=1.$$

11. Write the degree of the differential equation

$$Inigg(rac{d^2y}{dx^2}igg)=y.$$

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12. Write the order of the differential equation whose general

solution is $y = ax^2 + b$, where a and b are arbitrary

constants.



13. Write the order and the degree of the following differential equation.

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



14. Write the order and degree of the differential equation

$$\left(rac{dy}{dx}
ight)^5 = rac{\left(rac{d^2y}{dx^2}
ight)^3}{1+rac{dy}{dx}}$$



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15. Determine the order and degree of the differential

equation
$$rac{d^2y}{dx^2}=rac{2y^3+\left(rac{dy}{dx}
ight)^3}{\sqrt{rac{d^2y}{dx^2}}}$$



16. Write the order and degree of the differential equation

$$\left(rac{d^2y}{dx^2}+rac{dy}{dx}
ight)^5+\left(rac{d^3y}{dx^3}
ight)^2=x^4\sqrt{3rac{d^3y}{dx^3}+1}$$

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17. If p and q are the order and degree of the differential equation $y\left(\frac{dy}{dx}\right)^2 + x^2\frac{d^2y}{dx^2} + xy = \sin x$, then choose the correct statement out of p > q

18. If p and q are the order and degree of the differential equation $y \left(\frac{dy}{dx}\right)^2 + x^2 \frac{d^2y}{dx^2} + xy = \sin x$, then choose the

p = q

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19. If p and q are the order and degree of the differential equation $y\left(\frac{dy}{dx}\right)^2 + x^2\frac{d^2y}{dx^2} + xy = \sin x$, then choose the

correct statement out of

p < q

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20. Verify that the function $y=\sqrt{a^2-x^2}, x\in(-a,a)$ is a solution of differential equation $x+yrac{dy}{dx}=0(y
eq 0).$

21. Verify that $y = e^{-x} + Ax + B$ is a solution of the differential equation $e^x \left(\frac{d^2 y}{dx^2} \right) = 1.$

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22. Write the differential equation obtained by elimenating

the arbitrary constant C in the equation representing the

family of curves $xy = C \cos x$.

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23. Write the differential equation of the family of straight

lines parallel to the Y-axis.



24. Form the differential equation whose primitive is $y = Ae^{3x} + Be^{-3x}$.

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25. Obtain the differential equation whose primitive is $y = Ae^{2x} + Be^{-2x}$.

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Questions For Practice Of Part I Short Answer Type

1. If
$$f'(x) = e^x + \frac{1}{1+x^2}$$
 and $f(0) = 1$, then f(x).

.

2. Find the particular solution of the differential equation

 $rac{d^2y}{dx^2}=6x,$ given that $y=1~~{
m and}~~rac{dy}{dx}=2$, when x= 0 at Y-axis.



3. Find the differential equation whose general solution is

 $ax^2 + by = 1$, where a and b are arbitrary constants.



4. Obtain the general solution of the following differential equations.

$$\frac{dy}{dt} = e^{2t+3y}$$
Solution
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5. Find the differential equation whose general solution is
 $y = a \cos x + b \sin x.$
Solution
Watch Video Solution

6. Find the differential equation whose general solution is

 $C_1x^2+C_2y^2=1$, where C_1 and C_2 are arbitrary

constants.



7. Show that $y=Ae^{mx}+Be^{nx}$ is a solution of the differential equation $rac{d^2y}{dx^2}-(m+n)rac{dy}{dx}+mny=0.$

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8. Form the differential equation for the family of curves $ay^2 = \left(x-c
ight)^3$, where c is a parameter.

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9. Form the differential equation for the family of the curves $y^2 = a(b-x)(b+x)$, where a and b are arbitrary

constants.



10. Form the differential equation having $y = \left(\sin^{-1}x\right)^2 + A\cos^{-1}x + B$, where A and B are

arbitrary constants, as its general solution.

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Questions For Practice Of Part I Long Answer Type

1. Form the differential equation of the family of ellipse

having foci on Y-axis and centre at origin.



2. Form the differential equation of the family of all circles of

radius r.



Questions For Practice Of Part Ii Very Short Answer Type

1. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$rac{dy}{dx} - rac{x}{x^2+1} = 0$$

2. Solve the following differential equations (or find the general solution (or solution) of following differential equations) $dy = x^2$

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



3. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$rac{dy}{dx} = x^3 e^{-2y}$$

4. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$rac{dy}{dx} = \sqrt{4-y^2}(-2 < y < 2)$$

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5. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$rac{dy}{dx} = \sin^{-1}x.$$

6. Solve the following differential equations (or find the general solution (or solution) of following differential equations) $\frac{dy}{dx} = 1 - x + y - xy.$

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7. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

8. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

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9. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$ig(1+y^2ig) { ext{tan}}^{-1} x dx + 2y ig(1+x^2ig) dy = 0.$$

10. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

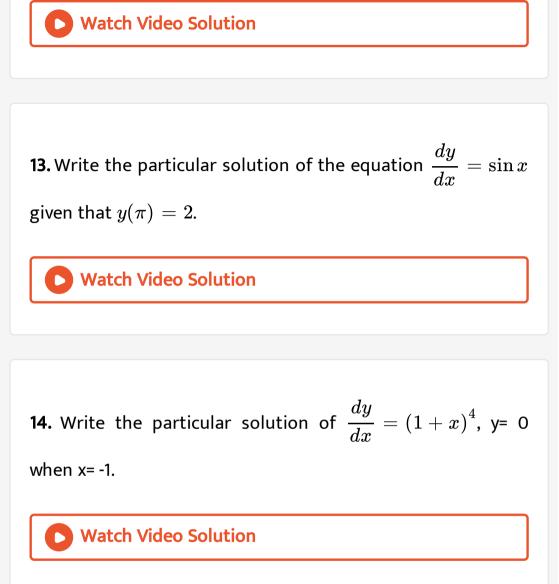
 $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0.$

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11. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

 $\cos x(1+\cos y)dx - \sin y(1+\sin x)dy = 0.$

12. Solve
$$\displaystyle rac{dy}{dx} = y an x$$
 , when x= 0 and y= 1.



15. Form the differential equation , whose solution is

$$y = e^{x+a}$$



when x=0,y=1.

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17. Given the general solution as $y=ig(x^2+cig)e^{-x}$ of a

differential equation, if y=0 when x= 1?

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Questions For Practice Of Part Ii Short Answer Type

1. Solve
$$\displaystyle rac{dy}{dx} = \displaystyle rac{x^2+y^2}{xy}$$



2. Solve
$$(x-1)rac{dy}{dx}=2x^3y$$
.

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3. Find the particular solution of the differential equation

$$e^x\sqrt{1-y^2}dx+rac{y}{x}dy=0$$
, given that y= 1, when x=0.

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4. Solve the initial value problem $e^{rac{dy}{dx}}=x+1,$ y(0)=5.

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

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6. Find the particular solution of the differential equation

 $rac{dy}{dx} = 1 + x + y + xy$, given that y=0, when x= 1.

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7. Find the particular solution of the differential equation

(x-y)(dx+dy)=dx-dy, given that y=-1, when x=0.

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



9. Find the equation of the curve passing through the point

 $\left(0, \frac{\pi}{4}\right)$, whose differential equation is

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



10. Find the particular solution of the differential equation

$$rac{dy}{dx} - rac{y}{x} + \cos ec \Big(rac{y}{x}\Big) = 0$$
, y= 0 when x=1.

11. Solve the following differential equation

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

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12. Solve the following differential equation
$$x \cos\left(\frac{y}{x}\right) \frac{dy}{dx} = y \cos\left(\frac{y}{x}\right) + x, x \neq 0.$$

13. Solve the differential equation

$$ye^{\frac{x}{y}}dx = \left(xe^{\frac{x}{y}} + y^2\right)dy(y \neq 0).$$

14. Solve
$$rac{dy}{dx}=rac{y^2}{xy-x^2}.$$

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Questions For Practice Of Part Ii Long Answer Type

1. Solve
$$rac{d^2y}{dx^2} = \cos ec^2 x.$$

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2. Solve
$$rac{d^2y}{dx^2}=9e^{-3x}$$

3. Solve
$$rac{dy}{dx} = 4e^{2x} + \cos x + \sec^2 x$$
, given that $y(0) = 2$, .

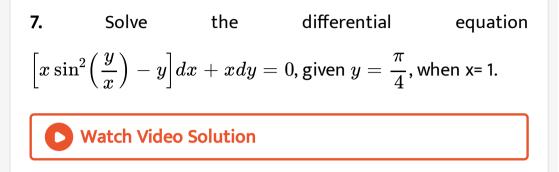


4. Solve
$$rac{dy}{dt} = \cos^2(y).$$

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5. Solve
$$(x-1)dx - (y+5)dy = 0$$
.

6. Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{x+1}{\sin y + \cos y}$ given that $y = \frac{\pi}{2}$, when x= 1.

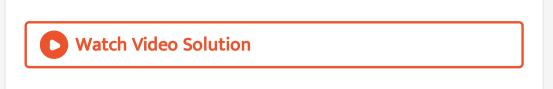


8. Find the solution of the differential equation $\left\{x\cos\left(\frac{y}{x}\right) + y\sin\left(\frac{y}{x}\right)\right\}ydx = \left\{y\sin\left(\frac{y}{x}\right) - x\cos\left(\frac{y}{x}\right)\right\}xdy$

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9. Show that the differential equation $2y \cdot e^{rac{x}{y}} dx + \Big(y - 2xe^{rac{x}{y}}\Big) dy = 0.$ Is homogeneous and find

its particular solution, given that x=0, when y= 1.



10. Find the particular solution of the differential equation

$$rac{dy}{dx} = rac{xy}{x^2+y^2}$$
 given that y= 1, when x=0.

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11. Solve the differential equation $x^2 dy + ig(xy + y^2ig) dx = 0$

given y=1, when x=1.



12. Find the general solution of differential equation $\tan y dx + \cot x dy = 0.$

13. For the differential equation $xy \frac{dy}{dx} = (x+2)(y+2)$,

find the solution curve passing through the point (1, -1).

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14. Show that the general solution of the differential

equation
$$rac{dy}{dx}+rac{y^2+y+1}{x^2+x+1}=0$$
 is given by

(x+y+1)=A(1-x-y-2xy), where A is a parameter.

15. A population grows at the rate of 5% per year. How long

does it take for the population to double?



16. In a bank, principal increases continuously at the rate of 5% per year. An amount of Rs 1000 is deposited with this bank, how much will it be worth after 10 yr? $(e^{0.5} = 1.648)$.

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Questions For Practice Of Part Iii Very Short Answer Type

1. Find the integrating factor of the differential equation

$$igg(rac{e^{-2\sqrt{x}}}{\sqrt{x}}-rac{y}{\sqrt{x}}igg)rac{dx}{dy}=1.$$

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2. Find the integrating factor of
$$x \frac{dy}{dx} + 2y = x \cos x$$
.

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3. Write the integrating factor of the differential equation

$$\left(1+y^2
ight)+(2xy-\cot y)rac{dy}{dx}=0$$

4. Solve
$$rac{dy}{dx}+rac{y}{2x}=3x^2$$

5. Solve
$$rac{dy}{dx} + y = \cos x - \sin x$$

6. Solve
$$rac{dy}{dx}+2xy=y$$



7. Solve
$$rac{dy}{dx} - 2y = \cos 3x$$

8. Solve the differential equation $x \frac{dy}{dx} + y = x^3$, given that

y=1, when x= 2.

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9. Solve
$$ydx + ig(x-y^3ig)dy = 0.$$

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10. Write an integrating factor of the differential equation

$$rac{dy}{dx} + y = e^{-x}.$$



11. Find an integrating factor of the differential equation (x +

tan y) dy = tan ydx.



12. Write an integrating factor of the differential equation

$$ig(1+y^2ig)dx=ig(an^{-1}y-xig)dy.$$

13. Write an integrating factor of the equation
$$rac{dy}{dx} - rac{y}{x} = x^2 + 1$$



14. Find the factor that should be multiplied with the differential equation $\cos x \frac{dy}{dx} + y \sin x = 3$ to make it integrable.

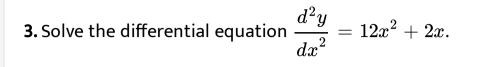
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Questions For Practice Of Part Iii Short Answer Type

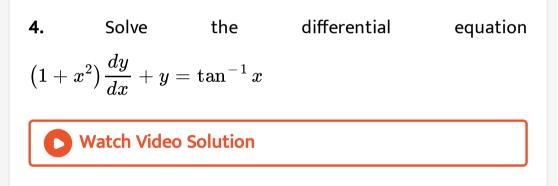
1. Find the integrating factor of the solution of the differential equation $Iny \frac{dy}{dx} = -yIny$.

2. Solve
$$x rac{dy}{dx} - y = \log x$$





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5. Solve the differential equation $ig(1+x^2ig)rac{dy}{dx}+y=e^{ an^{-1}x}$

6. Solve
$$(1+x^2)rac{dy}{dx}+2xy=rac{1}{1+x^2}$$
 where y= 0 and x= 1.

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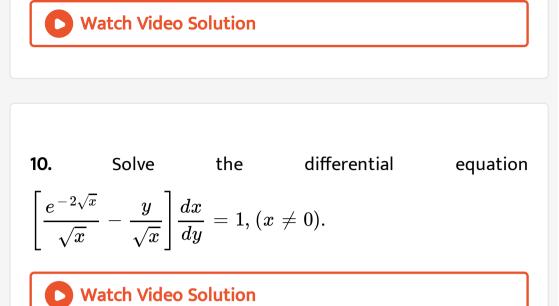
7. Solve
$$ig(x^2+1ig)rac{dy}{dx}-2xy=ig(x^2+2ig)ig(x^2+1ig).$$

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8. Solve the differential equation
$$(1+x^2)dy+2xydx=\sec^2xdx.$$

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9. Find the general solution of the differential equation $(x\log x)\frac{dy}{dx} + y = \frac{2}{x}\log x.$



11. Solve the differential equation $(y + 3x^2) \frac{dx}{dy} = x$.

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Questions For Practice Of Part Iii Long Answer Type

1. Solve
$$rac{dy}{dx} = xy^2$$



2. Solve
$$rac{dy}{dx} = y \cot x.$$

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3. Find the particular solution of the differential equation

 $xrac{dy}{dx}+y-x+xy \operatorname{cot} x=0, x
eq 0$, given that when $x=rac{\pi}{2}, y=0.$

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4. Solve
$$rac{dy}{dx} - 3y \cot x = \sin 2x$$
, when y=2 and $x = rac{\pi}{2}$

5. Solve the differential equation
$$(x^2+1)\frac{dy}{dx}+2xy=\sqrt{x^2+4},$$

6. Find the general solution of the differential equation

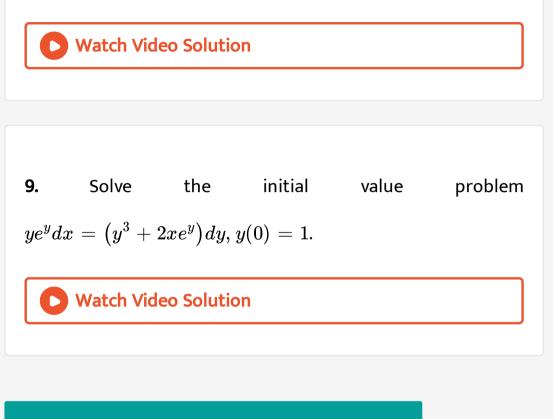
$$ig(1+y^2ig)rac{dx}{dy}+ig(x-e^{ an^{-1}y}ig)=0.$$

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7. Find the particular solution of the differential equation

 $(an^{-1} y - x) dy = ig(1+y^2ig) dx$, given that x= 1, when y=0.

8. solve:
$$(x-\sin y)dy+(\tan y)dx=0$$



Odisha Bureau S Textbook Solutions Exercise 11 A

1. Determine the order and degree of each of the following

differential equations.

 $y \sec^2 x dx + \tan x dy = 0$



2. Determine the order and degree of each of the following

differential equations.

$$\left(rac{dy}{dx}
ight)^4+y^5=rac{d^3y}{dx^2}$$

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3. Determine the order and degree of each of the following

differential equations.

$$arac{d^2}{dx^2}=\left\{1+\left(rac{dy}{dx}
ight)^2
ight\}^rac{3}{2}$$

4. Determine the order and degree of each of the following

differential equations.

$$an^{-1}\sqrt{rac{dy}{dx}}=x$$

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5. Determine the order and degree of each of the following

differential equations.

$$\ln\!\left(rac{d^2y}{dx^2}
ight)=y$$

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6. Determine the order and degree of each of the following differential equations.

$$\frac{\frac{dy}{dt}}{y + \frac{dy}{dt}} = \frac{yt}{\frac{dy}{dt}}$$

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7. Determine the order and degree of each of the following

differential equations.

$$rac{d^2y}{du^2} = rac{3y+rac{dy}{du}}{\sqrt{rac{d^2y}{du^2}}}$$



8. Determine the order and degree of each of the following

differential equations.

$$e^{rac{dy}{dx}}=x^2$$

9. Form the defferential equation by eliminating the arbitrary

constants in each of the following cases.

y = A sec x

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10. Form the defferential equation by eliminating the arbitrary constants in each of the following cases.

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

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11. Form the defferential equation by eliminating the arbitrary

constants in each of the following cases.

$$y = Ae^t + Be^{2t}$$



12. Form the defferential equation by eliminating the arbitrary

constants in each of the following cases.

 $y = Ax^2 + Bx$

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13. Form the defferential equation by eliminating the arbitrary

constants in each of the following cases.

 $y = a \cos x + b \sin x$



14. Form the defferential equation by eliminating the arbitrary constants in each of the following cases.

 $y=a\sin^{-1}x+b\cos^{-1}x$



15. Form the defferential equation by eliminating the arbitrary

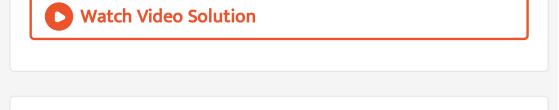
constants in each of the following cases.

 $y = at + be^t$

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16. Form the defferentialequation by eliminating the arbitrary constants in each of the following cases.

 $y = a \sin t + b e^t$



17. Form the defferential equation by eliminating the arbitrary

constants in each of the following cases.

$$ax^2 + by = 1$$



18. Find the general solution of the following differential

equation.

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

19. Find the general solution of the following differential

equation.

 $\frac{dy}{dx} = x\cos x$

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20. Find the general solution of the following differential

equation.

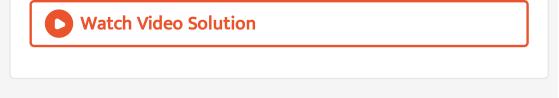
$$rac{dy}{dt} = t^5 \log t$$



21. Find the general solution of the following differential equation.

$$rac{dy}{dt} = 3t^2 + 4t + \sec^2 t$$

-



22. Find the general solution of the following differential

equation.

$$rac{dy}{dx}=rac{1}{x^2-7x+12}$$

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23. Find the general solution of the following differential

equation.

$$rac{dy}{du}=rac{u+1}{\sqrt{3u^2+6u+5}}$$

24. Find the general solution of the following differential equation.

$$ig(x^2+3x+2ig)dy-dx=0$$

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25. Find the general solution of the following differential

equation.

$$rac{dy}{dt}=rac{\sin^{-1}te^{\sin^{-1}}}{\sqrt{1-t^2}}$$

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26. Solve the following differential equations.

dy/dx=y+2

27. Solve the following differential equations.

$$rac{dy}{dt}=\sqrt{1-y^2}$$

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28. Solve the following differential equations.

$$rac{dy}{dz} = \sec y$$

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29. Solve the following differential equations.

$$rac{dy}{dx}=e^y$$

30. Solve the following differential equations.

$$rac{dy}{dx} = y^2 + 2y$$

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31. Solve the following differential equations.

$$dy + ig(y^2+1ig) dx = 0$$

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32. Solve the following differential equations.

`dy/dx+e^y/y=0



33. Solve the following differential equations.

dx+cot x dt=0



34. Obtain the general solution of the following differential

equations.

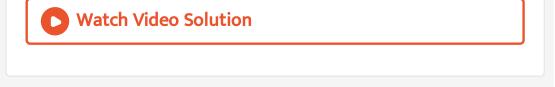
$${dy\over dx}ig(x^2+1ig)ig(y^2+1ig)$$

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35. Obtain the general solution of the following differential

equations.

$$rac{dy}{dt}=e^{2t+3y}$$



36. Obtain the general solution of the following differential

equations.

$$rac{dy}{dz} = rac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$$

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37. Obtain the general solution of the following differential

equations.

 $rac{dy}{dx} = rac{x\log x}{3y^2+4y}$

38. Obtain the general solution of the following differential

equations.

$$x^2\sqrt{y^2+3}dx+y\sqrt{x^3+1}dy=0$$

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39. Obtain the general solution of the following differential equations.

`tan y dx+cot x dy=0

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40. Obtain the general solution of the following differential equations.

$$ig(x^2+7x+12ig) dy + ig(y^2-6y+5ig) dx = 0$$



41. Obtain the general solution of the following differential equations.

 $ydy + e^{-y}x\sin xdx = 0$



42. Solve the following second order equation

$$rac{d^2y}{dx^2}=12x^2+2x$$

43. Solve the following second order equations

$$rac{d^2 y}{dt^2} = e^{2t} + e^{-1}$$

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44. Solve the following second order equation

$$rac{d^2 y}{d artheta^2} = \ -\sin artheta + \cos artheta + \sec^2 artheta \; .$$

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45. Solve the following second order equations

$$\cos ecx rac{d^2y}{dx^2} = x$$

46. Solve the following second order equation

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

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47. Solve the following second order equation

$$\sec x rac{d^2 y}{dx^2} = \sin 3x$$



48. Solve the following second order equations

$$rac{d^2y}{dx^2} = \sec^2 x + \cos x$$



49. solve:
$$e^{-x} rac{d^2 y}{dx^2} = x$$

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50. Find the particular solutions of the following equations

subject to the conditions

 $\frac{dy}{dx} = \cos x$ given that y= 2 when x=0.

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51. Find the particular solutions of the following equations

subject to the conditions

$$rac{dy}{dt}=\cos^2 y$$
 subject to $y=rac{\pi}{4}$ when t=0.

52. Find the particular solutions of the following equations

subject to the conditions

$$rac{dy}{dx}=rac{1+y^2}{1+x^2}$$
, given that $y=\sqrt{3}$ when x=0

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53. Find the particular solutions of the following equations

subject to the conditions

$$rac{d^2y}{dx^2}=6x,$$
 given that $y=1~~{
m and}~~rac{dy}{dx}=2$ when x=0

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54. Solve :
$$rac{dy}{dx} = \sec(x+y)$$

55. Solve :
$$\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$$

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56. Solve :
$$rac{dy}{dx} = \cos(x+y)$$

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57. Solve the differential equation
$$rac{dy}{dx} + 1 = e^{x+y}$$

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$$rac{dy}{dx} + y = e^{-x}$$

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2. Solve the following differential equations

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

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3. Solve the following differential equations

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

$$x\log xrac{dy}{dx}+y=2\log x$$

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5. Solve the following differential equations

$$ig(1+x^2ig)rac{dy}{dx}+2xy=\cos x$$



6. Solve the following differential equations.

dy/dx +y=sec x=tan x



 $(x+ an y)dy=\sin 2ydx$



8. Solve the following differential equations

$$ig(x+2y^3ig)rac{dy}{dx}=y$$

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9. Solve the following differential equations.

sin x dy/dx +3y=cos x



$$(x+y+1)rac{dy}{dx}=1$$

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11. Solve the following differential equations

$$ig(1+y^2ig)dx+\Big(x-e^{- an^{-1}y}\Big)dy=0$$

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12. Solve the following differential equations

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



$$xrac{dy}{dx}+y=y^2\log x$$

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14. Solve the following differential equations.

$$ig(1+x^2)rac{dy}{dx}=xy-y^2$$

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15. Solve the following differential equations.

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

$$rac{dy}{dx}+rac{y}{x}=x^2, y(1)=1$$

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17. Solve the following differential equations

$$rac{dy}{dx}+2y an x=\sin x,y\Big(rac{\pi}{3}\Big)=0$$

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Odisha Bureau S Textbook Solutions Exercise 11 C

1. Find the solutions of the following differential equations :

$$(x+y)dy+(x-y)dx=0$$

$$rac{dy}{dx} = rac{1}{2}igg(rac{y}{x}+rac{y^2}{x^2}igg)$$

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3. Find the solutions of the following differential equations :

$$ig(x^2+y^2ig)dx-2xydy=0$$

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4. Find the solution of the following differential equations:

$$xrac{dy}{dx}+\sqrt{x^2+y^2}=y$$

$$x(x+y)dy=ig(x^2+y^2ig)dx$$

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6. Find the solutions of the following differential equations :

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

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7. Find the solutions of the following differential equations :

$$x\sinrac{y}{x}dy = \Big(y\sinrac{y}{x} - x\Big)dx$$

$$xdy-ydx=\sqrt{x^2+y^2}dx$$

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9. Solve the differential equation
$$rac{dy}{dx} = rac{y-x+1}{y+x+5}.$$

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10. Find the solutions of the following differential equations :

$$(x-1)dy = (y+1)dx$$

$$(x-2)dx+(2y-3)dy=0$$



12. Find the solutions of the following differential equations :

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

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13. Find the solution of the following differential equations:

(2x+y+1)dx+(4x+2y-1)dy=0

(2x+3y-5)dy/dx+3x+2y-5-0

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15. Find the solution of the following differential equations:

(4x+6y+5)dx-(2x+3y+4)dy=0

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Chapter Practice Very Short Answer Type Questions

1. Find the order and degree of the following differential equations :

$$\left(rac{d^2y}{dx^2}
ight)^3+2\left(rac{dy}{dx}
ight)^4+6=\cos x$$

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2. Find the order and degree of the following differential

equations :

$$rac{d^4y}{dx^4}+\sin\!\left(rac{d^3y}{dx^3}
ight)=0$$

3. Find the order and degree of the following differential equations :

$$rac{d^2y}{dx^2} = \sqrt{1 + \left(rac{dy}{dx}
ight)^2}$$

4. Find the order and degree of the following differential

equations :

$$xrac{dy}{dx}+rac{2}{(dy/dx)}=y^2$$
 .

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5. Find the order and degree of the following differential

equations :

$$x^3igg(rac{d^2y}{dx^2}igg)^2+xigg(rac{dy}{dx}igg)^4=0$$



6. Find the order and degree of the following differential equations :

$$rac{d^2y}{dx^2} + \left[1 + \left(rac{dy}{dx}
ight)^3
ight]^{rac{5}{2}} = 0$$

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7. State whether $y = e^{-x}(x+a)$ is a solution of differential

equation
$$\displaystyle rac{dy}{dx} + y = e^{\,-\,x}$$

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8. Verify that the function $y = a \cos x + b \sin x$, where

 $a,b\in R$ is a solution of the differential equation $rac{d^2y}{dx^2}+y=0$

9. Show that the function $y = (A + Bx)e^{3x}$ is a solution of

the equation
$$\displaystyle rac{d^2y}{dx^2} - 6 \displaystyle rac{dy}{dx} + 9y = 0$$

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10. Show that
$$y=Cx+rac{a}{C}$$
 is a solution of differential equation $y=xrac{dy}{dx}+rac{a}{rac{dy}{dx}}$, where C is a parameter.

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11. Prove that $xy = ae^x + be^{-x} + x^2$ is the general solution

of the differential equation
$$xrac{d^2y}{dx^2}+2rac{dy}{dx}-xy+x^2-2=0$$

12. Show that the function
$$\phi$$
, defined by $\phi(x)=\cos x(x\in R)$, satisfies the initial value problem $rac{d^2y}{dx^2}+y=0, y(0)=1, y'(0)=0.$

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13. Find the differential equation of the family of all straight

lines.



14. Write the differential equation of all non-horizontal lines

in a plane.



15. Write the differential equation representing the family of

curves y = mx, where m is an arbitrary constant.

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16. Find the differential equation of the family of concentric

circles having centre (0, 0).



17. Find the differential equation of the family of curves

 $y = Ae^x + Be^{-x}$, where A and B are constants.

18. Form the differential equation by aliminating A and B in

$$Ax^2 + By^2 = 1$$

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19. Find the differential equation corresponding to curve $y = a \cos(x + b)$, where a and b are constants.



20. Solve the following differential equations :

$$rac{dy}{dx} = \sqrt{1-y^2}, \; -1 < y < 1$$

$$rac{dy}{dx} + y = 1, y
eq 1.$$

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22. Solve the following differential equations :

$$rac{dy}{dx} - rac{y(x+1)}{x} = 0$$

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23. Solve the following differential equations :

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



24. Write the solution of differential equation $\left(e^x+e^{-x}
ight)dy=\left(e^x-e^{-x}
ight)dx.$

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25. If
$$rac{dy}{dx} = y e^x extrm{ and } x = 0, y = e$$
, then find the value of y,

when x= 1.

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

27. Solve the differential equation $\frac{dy}{dx} = y \sin 2x$, given that y(0) = 1.Watch Video Solution **28.** Solve the initial value problem $dy = e^{2x+y} dx, y(0) = 0.$ Watch Video Solution

29. Find the equation of a curve passing through the point (-2, 3), given that slope of the tangent to the curve at any point (x, y) is $\frac{2x}{y^2}$.

30. Show that the given differential equation is homogeneous ans solve it $y' = rac{x+y}{x}$.

31. Find the integrating factor of the differential equation

$$xrac{dy}{dx} - y = 2x^2.$$

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32. Find the integrating factor of the differential equation

$$ig(1-y^2ig)rac{dx}{dy} + yx = ay, \ -1 < y < 1.$$

33. Write the integrating factor of
$$\frac{dy}{dx} - \frac{1}{(1+x)}y = (1+x)e^x$$
.

34. Write the integrating factor of the differential equation

$$\sqrt{x}rac{dy}{dx}+y=e^{-2\sqrt{x}}.$$

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35. Find the general solution of
$$rac{dy}{dx} + ay = e^{mx}$$

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Chapter Practice Short Answer Type Questions

 $x\cos ydy = (xe^x\log x + e^x)dx.$



2. Solve each of the following differential equations :

$$ig(1+y^2ig)(1+\log x)dx+xdy=0.$$



3. Solve each of the following differential equations :

$$rac{dy}{dx}+rac{1+\cos 2y}{1-\cos 2x}=0$$

$$(x+1)rac{dy}{dx}=2e^{-y}-1,y=0$$
 when x=0.

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5. Solve each of the following differential equations :

$$2xydx+ig(x^2+2y^2ig)dy=0.$$

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6. Solve each of the following differential equations :

$$ig(x^2-yx^2ig)dy+ig(y^2+x^2y^2ig)dx=0.$$

$$rac{dy}{dx} + 2y = 6e^x.$$

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8. Solve each of the following differential equations :

$$xrac{dy}{dx}-y=\sqrt{x^2+y^2}.$$

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9. Solve each of the following differential equations :

$$ig(1+x^2)rac{dy}{dx}-x=2 an^{-1}x.$$

$$ig(x+3y^2ig)rac{dy}{dx}=y(y>0)$$

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11. Solve each of the following differential equations :

$$xdy-ig(y+2x^2ig)dx=0.$$

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Chapter Practice Long Answer Type Questions

1. Form the differential equation representing the family of curves $y^2 - 2ay + x^2 = a^2$, where a is an arbitrary constant.



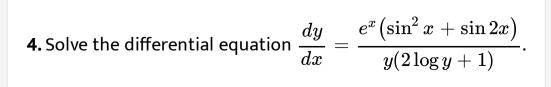
2. Form the differential equation of the family of circles in the

second quadrant, which touch the coordinate axes.

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3. Show that the differential equation represents the family of all parabolas having their axis of symmetry coincident with the axis of x is $yy_2 + y_1^2 = 0$.

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5. Solve the differential equation
$$\frac{dy}{dx} = 1 + x + y^2 + xy^2$$
,

when y=0, x=0.

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6. Solve
$$(x+y)^2 rac{dy}{dx} = a^2.$$

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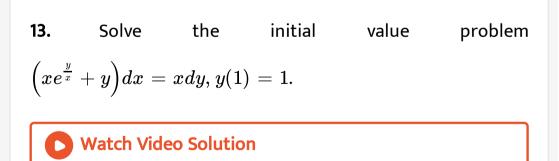
7. Show that the differential equation
$$(x^2 + xy)dy = (x^2 + y^2)dx$$
 is homogeneous and solve it.

8. Solve
$$x^2 \frac{dy}{dx} = x^2 + xy + y^2$$
.
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9. Show that the differential equation
 $(x^2 - y^2)dx + 2xydy = 0$ is homogeneous and solve it.
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10. Solve the differential equation
 $(1 + e^x)dx + (1 + e^y)dy = 0$.
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11. Find the particular solution of the differential equation $2xy + y^2 - 2x^2 rac{dy}{dx} = 0, y = 2$ when x=1.

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12. Solve
$$x^2 rac{dy}{dx} - xy = x, x = 1, y = rac{\pi}{2}.$$



14. Show that the family of curves for which the slope of the tangent at any point (x, y) on it is $\frac{x^2 + y^2}{2xy}$, is given by $x^2 - y^2 = Cx$.

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15. Find the general solution of
$$\displaystyle rac{dy}{dx} + 3y = \displaystyle rac{1}{e^{3x}}.$$

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16. Solve the differential equation $x \frac{dy}{dx} - ay = x + 1$.

17. Solve
$$y + rac{d}{dx}(xy) = x(\sin x + \log x).$$

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18. Find the particular solution of the differential equation

$$rac{dy}{dx}-x=x^2$$
, given that y=2, when x=0.

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19. Find the particular solution of the differential equation

$$rac{dy}{dx} = (y+1)e^{-x}$$
, given that y= 0, when x= 1.

20. Find the equation of a curve passing through the origin

and satisfying the differential equation
$$(1+x^2)\frac{dy}{dx}+2xy=4x^2$$

21. Find the particular solution of the differential equation

$$ig(1+x^2ig)rac{dy}{dx}=y$$
, given that y=1, when x=0.