



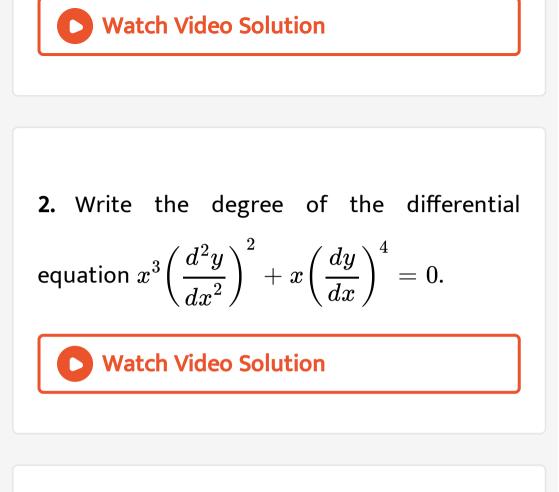
### MATHS

### **BOOKS - SHARAM PUBLICATION**

## **DIFFERENTIAL EQUATION**



# 1. Write the order and degree of the differential equation $\left(rac{dy}{dx} ight)^4 + (3y)rac{d^2y}{dx^2} = 0$



3. Write the differential equation representing the family of curves y = mx, where m is an arbitrary constant.



**4.** If p and q are the order and degree of the differential equation

$$y igg( rac{dy}{dx} igg)^2 + x^2 rac{d^2 y}{dx^2} + xy = \sin x$$
, then

choose the correct statement out of

p = q

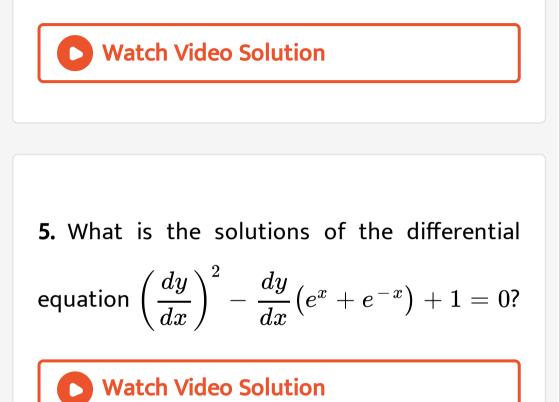
A. p>q

$$\mathsf{B.}\, p=q$$

$$\mathsf{C}.\, p < q$$

D.

#### Answer:



**6.** What is the solution of 
$$rac{dy}{dx} = \cos(x-y)$$

7. Find the particular solution of the differential equation 
$$\frac{d^2y}{dx^2} = 6x$$
, given that  $y = 1$  and  $\frac{dy}{dx} = 2$ , when x= 0 at Y-axis. Watch Video Solution

#### 8. Solve the following differential equation

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

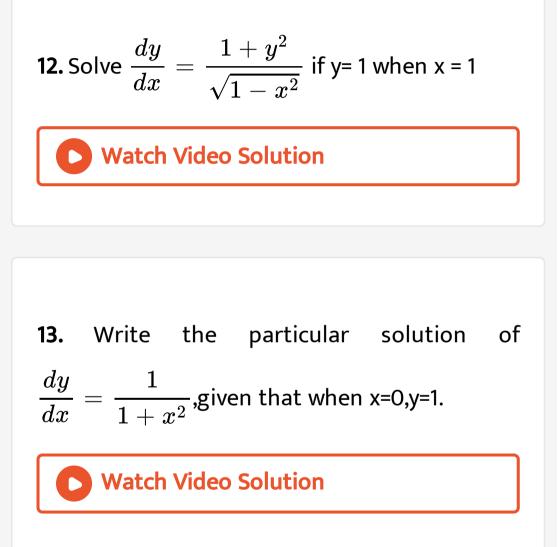
9. Solve the following differential equation :  $x^2(y-1)dx + y^2(x-1)dy = 0.$ Watch Video Solution

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

**11.** Solve 
$$\frac{dy}{dx}$$
 = cos 2x cos x, if y=2, when x = 0.







**14.** Write the differential equation of circles passing through the origin and having their centre on the x-axis.

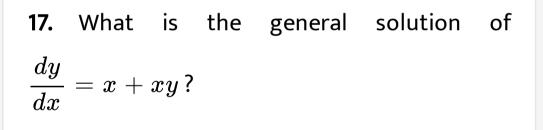


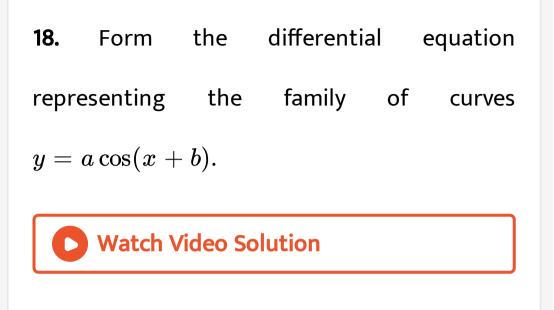
# 15. Find the general solution of the differential equation $(1+y^2)rac{dx}{du} + \left(x-e^{ an^{-1}y} ight) = 0.$

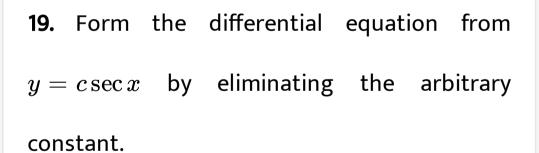
16. What is the solution of the equation

$$rac{d^2 y}{dx^2} = e^{\,-\,(\,2x\,)}\,$$
?

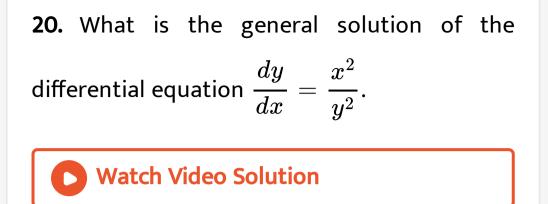
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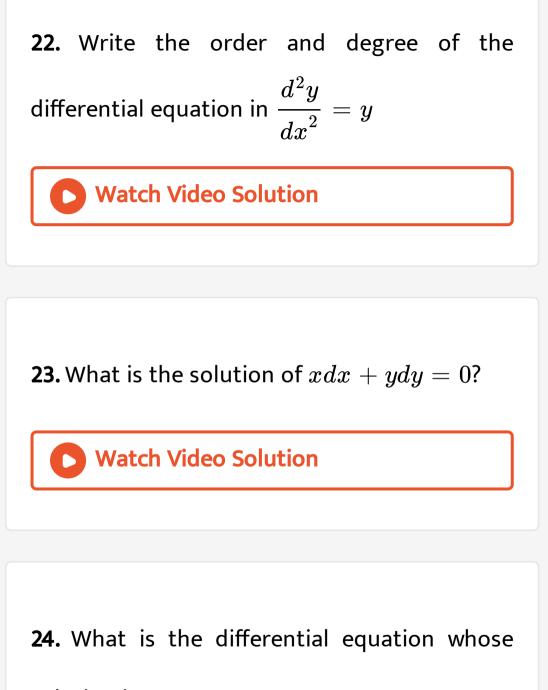




21. Write the differential equation of the family

of straight lines parallel to the Y-axis.





solution is y = mx + c.



## **25.** What is the order ofthe differential equation of all conics whose centre is at origin

?



**26.** What is the order of the differential equation of all conics whose axes coincide with the axes of coordinates.



27. Write the order of the differential equation whose general solution is  $y = ax^2 + b$ , where

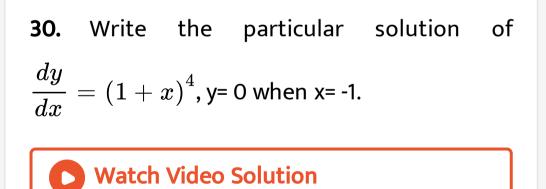
a and b are arbitrary constants.

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**28.** Write the particular solution of the equation 
$$\frac{dy}{dx} = \sin x$$
 given that  $y(\pi) = 2$ .

**29.** Write the order and the degree of the following differential equation.  $\frac{d^3y}{d^3y} = \left(\frac{d^2y}{d^2y}\right)^2 + \left(\frac{dy}{d^2y}\right)^4 + y$ 

$$rac{dx^3}{dx^3} = \left(rac{dx^9}{dx^2}
ight) \ + \left(rac{dy}{dx}
ight) \ + y$$



31. The differential equation of the family of

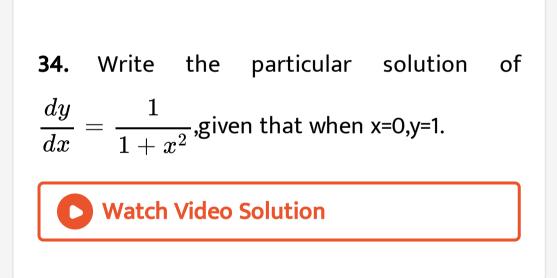
straight lines passing through origin is\_\_\_\_\_.

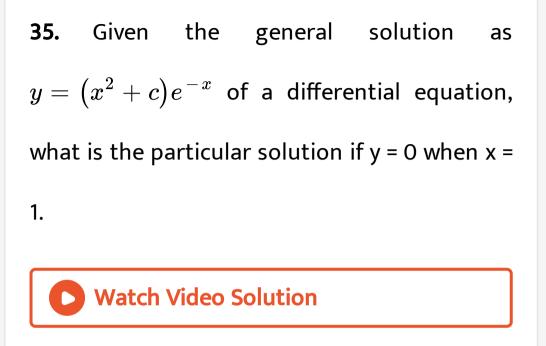


32. Obtain a differential eqution that should be satisfied by the family of concentric circles  $x^2 + y^2 = a^2.$ 

33. Form the differential equation , whose

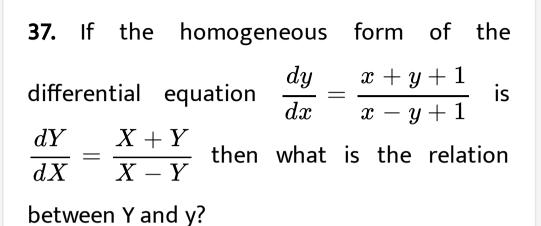
solution is  $y = e^{x+a}$ 





**36.** What is the order of the differential equation of all circles of radius r having centre on y-axis and passing through the origin ?

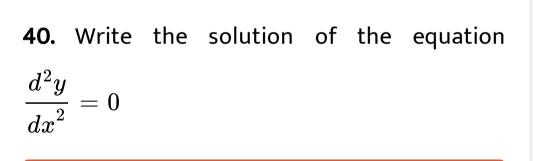




**38.** Write the differential equation of the parabola  $y^2 = 4x + 10.$ 

39. What is the differential equation whose

general solution is y = 3x + k.





**41.** Write the order and degree of the differential equation  $\left(\frac{dy}{dx}\right)^8 + \left(\frac{d^2y}{dx^2}\right) = 0$ 

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**42.** Write the solution of  $\frac{dy}{dx} = 8x$  given y = 1 when x = 2. **Vatch Video Solution** 

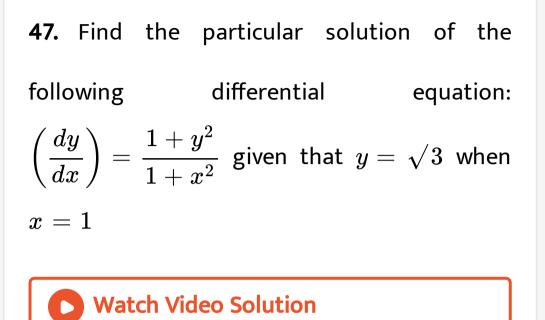
**43.** How many arbitrary constants does the general solution of the differential equation  $\frac{d^2y}{dx^2} = \sin x + \cos x \text{ contains?}$  **Watch Video Solution** 

# 44. Find the order and degree of a the differential equation $\left(\frac{dy}{dx}\right)^4 + y^5 = \frac{d^3y}{dx^3}.$

**45.** If p and q are respectively degree and order of the differential equation  $y = e^{dy/dx}$ , then write the relation between p and q.



**46.** From the differential equation whose general solution is  $y = a \sin t + be^t$ .



#### 48. Solve the following differential equations

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



equations

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



50. Find the differential equation representing family of curves given by  $\left(x-a
ight)^2+2y^2=a^2$ 

where a is an arbitrary constant.



51. Obtain the general solution of the

following differential equations.

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

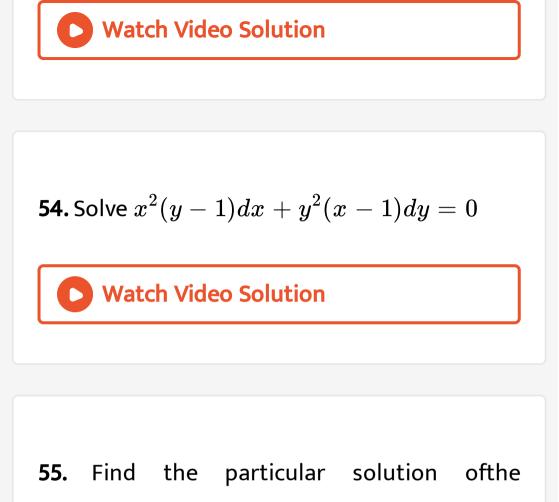
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52. Solve: 
$$ig(x^2-1ig)rac{dy}{dx}+2xy=1$$

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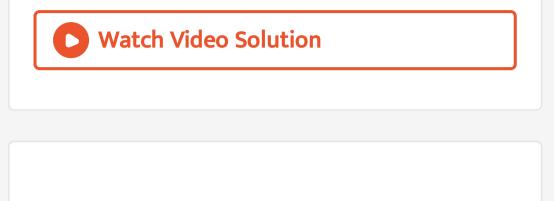
53. Solve the following differential equations

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



differential equation  $rac{d^2y}{dx^2}=6x$  given that y=1 and  $rac{dx}{dy}=2$  when x=0.

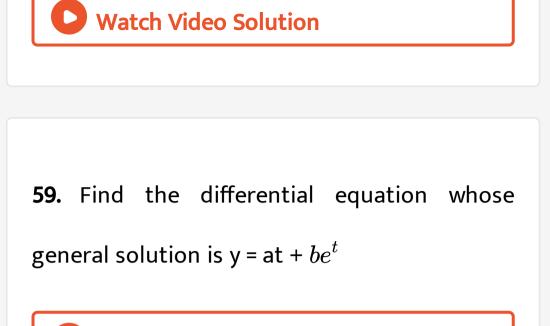
**56.** Solve : 
$$(x + y)dy + (x - y)dx = 0$$
.



**57.** Find the integrating factor of the differential equation.

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

58. Solve: 
$$\displaystyle rac{dy}{dx} = \displaystyle rac{1}{x^2 - 7x + 12}$$



**60.** Find the differential equation whose general solution is  $ax^2 + by = 1$ , where a and b are arbitary constants.

61. Solve 
$$\frac{dy}{dt} = t^2$$
.

**62.** Solve 
$$rac{dy}{dt}=e^{2t}$$

63. Solve the following differential equations.

(x+tan y)dy=sin 2y dx

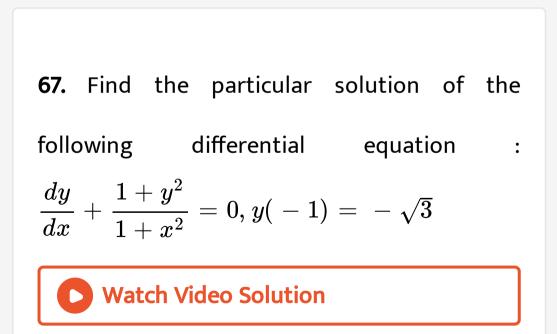


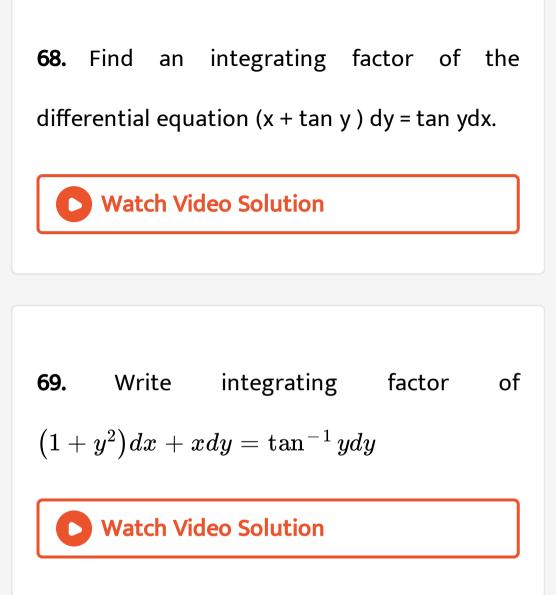


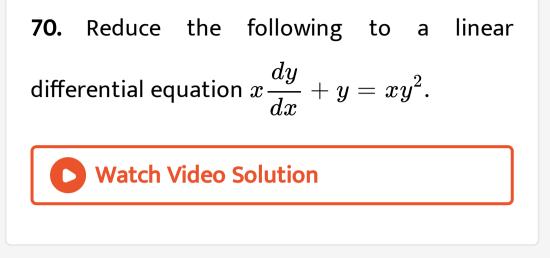
**64.** Solve 
$$rac{dy}{dx}=e^{2x+3y}.$$

**65.** Solve 
$$\frac{dy}{dx} = e^{-x}$$
.

**66.** Find the differential equation whose general solution is  $ax^2 + by = 1$ , where a and b are arbitary constants.







71. Write the order and degree of the

following

differential

( , ) 4

equation

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



72. Find the differential equation whose general solution is y = at +  $be^{t}$ Watch Video Solution **73.** Solve  $\frac{dy}{dx} = 4y$ . Watch Video Solution

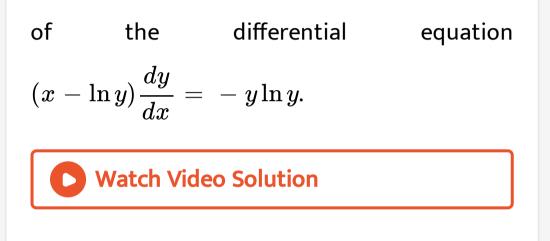
74. Write the differential equation of all non-

horizontal lines in a plane.





#### 75. Find the integrating factor for the solution

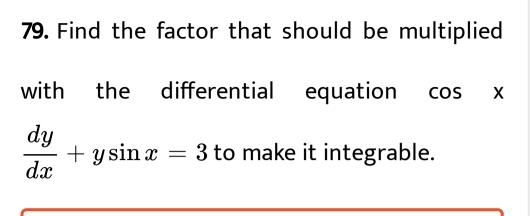


**76.** Find the differential equation whose general solution is  $y = a \cos x + b \sin x$ .

77. Write the order and degree of the differential equation
$$\left(\frac{d^2y}{dx^2} + \frac{dy}{dx}\right)^5 + \left(\frac{d^3y}{dx^3}\right)^2 = x^4 \sqrt{3\frac{d^3y}{dx^3} + 1}$$
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## 78. Obtain the differential equation whose

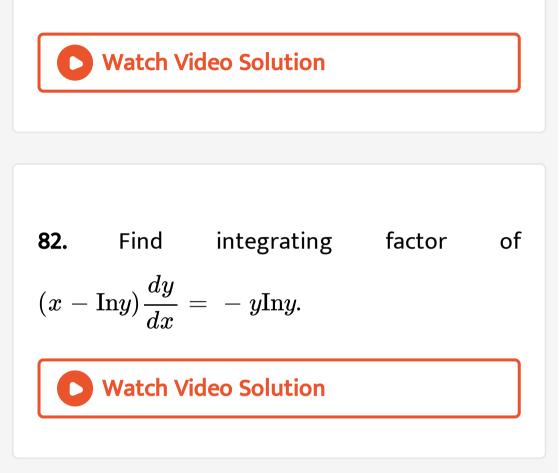
primitive is  $y = Ae^{2x} + Be^{-2x}$ .





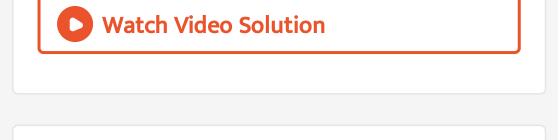
80. Find the differential equation whose general solution is  $ax^2 + by = 2$ 

**81.** Solve: 
$$ig(1+x^2ig)dy=ig(1+y^2ig)dx$$



83. Write the integrating factor of

$$rac{dy}{dx} + y \sec x = \tan x.$$



84. Form the differential equation whose

general solution is y=  $ae^x + bx$ 

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85. Reduce the following to a linear differential

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

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

y = A sec x

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**87.** Write the particular solution of  $\frac{dy}{dx} = 8x$ ,

given that y=2, when x=1.

88. Form the differential equation , whose

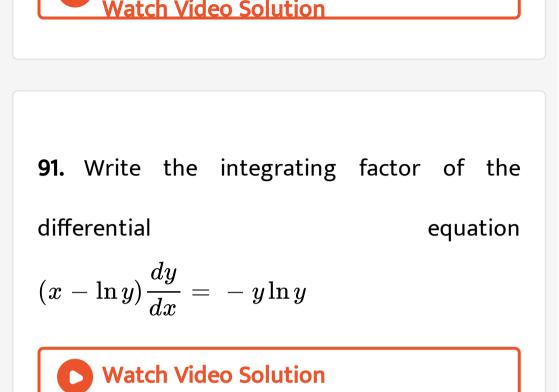
solution is 
$$y=e^{x+a}$$

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89. Find the solution of 
$$\frac{d^2y}{dx^2} = 3x^2 + 1$$
 given that y = 2 and  $\frac{dy}{dx} = 4$  when x = 0.

90. Solve 
$$rac{dy}{dx} = \cos x, y(0) = 1$$





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

differentialequation
$$\frac{dx}{dy} + x \cot y = 2y + y^2 \cot y (y \neq 0)$$
giventhat x = 0 when  $y = \frac{\pi}{2}$ . $\checkmark$  Watch Video Solution

**94.** Find the solution of the following differential equations:

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

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

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# 96. Find the solution of the following

differential equations:

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

$$rac{d^2y}{dx^2}=rac{1}{x(x+1)}+\cos ec^2x$$

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98. Solve the following differential equation:-

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

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

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100. Solve the following differential equation:-

$$rac{d^2y}{dx^2}=4e^x+x\cos x+\sec^2 x$$
 Given that  $y(0)=2,y^{\,\prime}(0)=4.$ 

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

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102. Solve the following differential equation:-

dy	 y	—	x	+	1

dx	$\overline{y} +$	x+5
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**103.** Obtain the general solution of the following differential equations.

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



## 104. Solve the following differential equation:-

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

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

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106. Solve the following differential equation:-

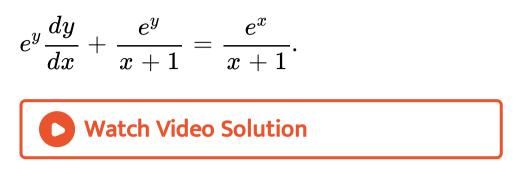
$$ig(1+y^2ig)xdx+ig(1-x^2ig)ydy=0.$$

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

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108. Solve the following differential equation:-

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



#### 110. Solve the following differential equation:-

$$rac{d^2y}{dx^2}=e^x$$



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

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#### 112. Solve the following differential equation:-

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

$$e^xrac{d^2y}{dx^2}=2x$$

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114. Solve the following differential equation:-

$$rac{dy}{dx} = rac{4x^3+6x}{x^4+3x^2+1}$$

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

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116. Solve the following differential equation:-

$$e^{-x}rac{d^2y}{dx^2}=x,y=3$$
and  $rac{dy}{dx}=2whenx=0.$ 

 $rac{dy}{dx}=rac{x\ln x}{3y^2+4y}$ , Given that y = 4 when x = 0

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118. Solve the following differential equation:-

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

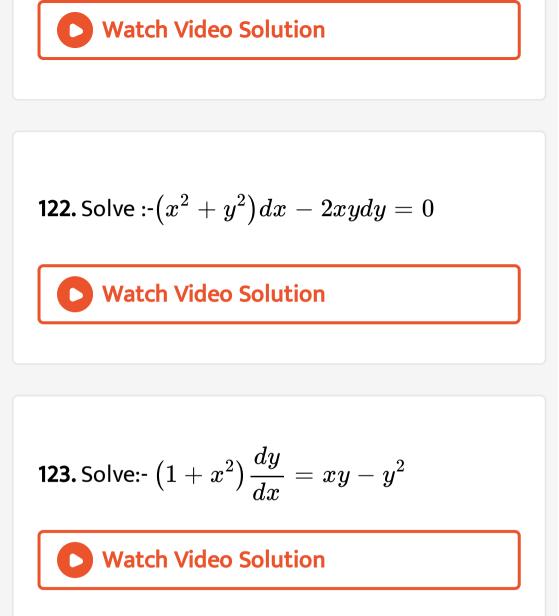
$$rac{d^2y}{dx^2} = xe^x, y(0) = 1, y^1(0) = 1$$

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120. Solve the following differential equation:-

$$rac{d^2y}{dx^2}=3x^2-x+1, y(0)=0, y^1(0)=1$$

121. Solve:-
$$rac{dy}{dx}+(xy)=xy^2$$



124.

#### Solve

:-

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