September 21, 2020

Definition

when an equation involves one or more desivatives w. N. t a particular variable. Then that variable is called an independent variable is called an independent variable. A variable is called dependent dent variable if a desivative of that variable occurs. The a equation

 $\frac{\partial^2 \mathbf{V} + \frac{\partial^2 \mathbf{V}}{\partial y^2} \mathbf{V} = 0$

has one dependent variable V and two independent variables x and y.

Definition An equation involving one dependent variable and its desivative w. N.t one or most independent variables, is called a Differential equetion. 09; i) $\frac{dy}{dn^2}y + 2 \frac{dy}{dn}y + y = 0$ ii) 22 W+ 22 U+ 26 U=0 There are two types of Differential equations:

i) Ordinaly Differential equations:
ii) Partial Differential equations.

1) Oldinary Differential equation (3) A differential equation which involves the desiratives of the dependent variable w. et a single independent variable is known as Vordinary Disperential equation. eg; i) $\frac{dy + 2y = \cos x}{dx}$ $\frac{d^3y + \chi y}{dx^3} \left(\frac{dy}{dx}\right) = 0$ $(ii) \left(\frac{d^2y}{dx^2}\right)^{4} + x - \frac{dy}{dx} - 4xy = 0$ are ordinary differential equations

ii) Partial D'yserential equation.

A differential equation which contains two or more independent variables and partial desirative w.s.t. them is called a Partial Differential equation. e.g.,

i) x. 22 + y. 2 = n =

ii) $\frac{\partial^2 V_+}{\partial x^2} \frac{\partial^2 V_+}{\partial y^2} \frac{\partial^2 V_-}{\partial z^2} = 0.$

 $\overline{iii}) \quad \frac{\partial^3}{\partial t^3} V = K \cdot \left(\frac{\partial^2}{\partial x^1} V \right)^{-1}$

are the partial differential equations.

Order of a Differential equation (3) The order of a differential equation is the order of the highest ordered desivative that occurs in the equation. e.g., has order 1. $\frac{dy}{dx} \neq 2x = 0$ $\frac{d^2y + 2(dy) + y = 0}{da^2y + 2(dny) + y}$ has order 2.

Degree et a Differential equation The degree of a differential equation is defined to be the expo-nent of the highest order desirative i) (dy) = cose $(i) \left(\frac{d^2y}{dx^2}\right) + 4y = 0$ $\frac{d^2y}{dx^2y} + 7\left(\frac{dy}{dx}\right) - 8y = 0.$ $(\frac{d}{dx}y)^{2} - 2(\frac{dy}{dx}y)^{4} + y = 0.$ 11,12. has digrees

$$(y)^{13}$$
 $(y)^{13} + 2y + 3y = 0$ $(y)^{13}$

$$(y''')^{2} + 2y'' + 4(y')^{4} = 0$$
 (2)

$$(y'')^{2} + 2(y')^{3} + 3y = 0 - 3$$

$$(y')^2 + 2y = 0 - 9$$

$$(y'')^{3} + 2y''' + 22(y'')^{2} + 2y + 3y = 0 - B$$

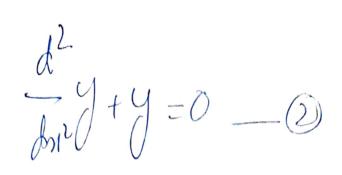
$$(y'')^{3} + 2(y')^{2} + 4y = \cos x - 6$$

Solution of a differential equation

A solution of a differential equation is a selection between the dependent and independent variables not involuing the derivatives such that this ving the derivatives such that this relations and the delivatives obtained from it satisfies the given differential equation egi,

patting the values of y and y'in equation() $\frac{1}{2}\int_{M}y^{2}-2y=0$ $\left(2\frac{2\chi}{2ce'}\right) - 2\left(\frac{2\chi}{ce'}\right) = 0$ General Solution A Solution of a differential

A Solution of a differential equation which contains the number of artitle governments equal to the order of the differential equation is called a General Solution.



(A)

The general Solution of eq. (2) is

y = 4 GSX + BSin 26

Particular Solution

A folition obtained from the general folition by giving partyaeneral folition by giving partyaction values to the constants is called a Particular Solution.

eg; d2y+y=0

(Z)

Formation of a differentical

 $= \qquad y' = 2c\alpha = 2$

From eq $0 = c = \frac{q}{x^2}$

Using in (2)

 $= \frac{y}{2} = 2 \left(\frac{y}{n^2}\right) x$

y = 24 n