

Solution of Differential Equations

Objectives:

1. To differentiate general solution from particular solution.
2. To verify if a given general or particular solution is a solution of a differential equation.

Solution of Differential Equations

Definition:

A non-derivative relation between the variables which satisfies the given differential equation is a solution of the differential equation.

General Solution:

- Solution which contains arbitrary constants which are usually represented by letters

Examples:

$$y = C_1x - C_2e^x$$

$$y = Ax^2 + Bx + C$$

Particular Solution:

- Obtained from the general solution by determining the value of the arbitrary constant and substituting it in the general solution.

Examples:

General solution:

$$y = x + C \quad ; \quad y(0) = 3$$

$$3 = 0 + C$$

$$C = 3$$

Particular solution:

$$y = x + 3$$

Explicit Solution:

- A solution in which the dependent variable is expressed solely in terms of the independent variable and constant.

Example:

$$y = \frac{C - x}{xe^x + 2}$$

Implicit Solution:

- A solution involving the relation of the dependent and independent variable not explicitly formed.

Example:

$$xye^x + 2y + x = C$$