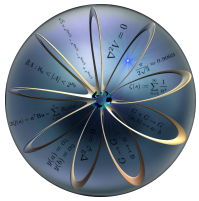

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solutions of ordinary differential equation

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Defines	general solution
Defines	particular solution

Let us consider the ordinary differential equation

$$F(x,\, y,\, y',\, y'',\, \ldots,\, y^{(n)}) = 0 \tag{1}$$

of order n.

The *general solution* of (1) is a function

$$x \mapsto y = \varphi(x,\, C_1,\, C_2,\, \ldots,\, C_n)$$

satisfying the following conditions:

a) y depends on n arbitrary constants $C_1,\, C_2,\, \ldots,\, C_n$.
b) y satisfies (1) with all values of $C_1,\, C_2,\, \ldots,\, C_n$
c) If there are given the initial conditions
$y = y_0,\, y' = y_1,\, y'' = y_2,\ \ldots,\, y^{(n-1)} = y_{n-1} \quad \text{when} \quad x = x_0,$
then one can chose the values of $C_1,\, C_2,\, \ldots,\, C_n$ such that $y = \varphi(x,\, C_1,\, C_2,\, \ldots,\, C_n)$ fulfils those conditions (supposing that $x_0,\, y_0,\, y_1,\, y_2,\, \ldots,\, y_{n-1}$ belong to the region where the conditions for the existence of the solution are valid).

Each function which is obtained from the general solution by giving certain concrete values for $C_1,\, C_2,\, \ldots,\, C_n,$ is called a *particular solution* of (1).