# Different Integrals (classification)

Let us consider a partial differential equation of order one as

$$f(x, y, z, p, q) = 0 \quad \text{— (1)}$$

Let its sol$^n$ be $F(x, y, z, a, b) = 0$ — (2) having equal number of constants $a, b$ as many an independent variable $x, y$.

**Complete integrals:→** Here eq$^n$ (2) is called complete integral of (1)

**Particular integrals:→** Particular values to 'a' & 'b' in eq$^n$ (2) we get particular solution (Particular integral)

**Singular integral:→** Here eq$^n$ (2)

i.e $F(x, y, z, a, b) = 0$ is complete integral.

Differenceating (2) by a we get

$$\frac{\partial F}{\partial a} = 0 \quad \text{— (3)}$$

Differenceating (2) by (b) we get

$$\frac{\partial F}{\partial b} = 0 \quad \text{— (4)}$$

Eliminating $a, b$ from (2) (3), (4) we get singular sol$^n$.

General integrals:→ Complete integral is

$$F(x, y, z, a, b) = 0 \quad — (2)$$

Let us put $b = \phi(a)$ then (2) is

$$F(x, y, z, a, \phi(a)) = 0 \quad — (5)$$

Differenceating (5) w.r.to a, we get

$$F'(x, y, z, \phi'(a)) = 0 \quad — (6)$$

Eliminating 'a' from (3), (6) & $b = \phi(a)$ we get the general solution.