

Degree of a Differential Equation:

It is the power of highest order derivative in the given differential equation.

For example;

in the differential equation:

$$x \frac{d^2 y}{dx^2} + (\sin x) \left(\frac{dy}{dx} \right)^{50} = \cos x,$$

the highest order of derivative is 2 i.e $\frac{d^2 y}{dx^2}$ with power one i.e $\left(\frac{d^2 y}{dx^2} \right)^1 = \frac{d^2 y}{dx^2}$, so its degree is one. Although here the 1st order derivative $\frac{dy}{dx}$ is of power 50, but $\frac{dy}{dx}$ is of order one which is less than order of $\frac{d^2 y}{dx^2}$.

Order of a Differential Equation:

It is the order of highest derivative which appears in a given differential equation. In the above example, $x \frac{d^2 y}{dx^2} + (\sin x) \left(\frac{dy}{dx} \right)^{50} = \cos x$, the highest order of derivative is 2. So the order of this differential equation is 2.