Question

The degree of differential equation $\left(\dfrac{d^3y}{dx^3}\right)^2 + 2\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx} + x^2\left(\dfrac{dy}{dx}\right)^3 = 0$ is

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Solution

The degree of a differential equation is the power of its highest derivative, after the equation has been made rational and integral in all of its derivatives.

To study the degree of a differential equation, the key point is that the differential equation must be a polynomial equation in derivatives, i.e., y', y'', y''' etc.

We observe that the differential equation

$$\left(\frac{d^3y}{dx^3}\right)^2 + 2\frac{d^2y}{dx^2} - \frac{dy}{dx} + x^2\left(\frac{dy}{dx}\right)^3 = 0$$

is a polynomial equation in y''', y'' and y'.

Then the degree of the differential equation can be defined.

The highest order derivative present in the differential equation is $\dfrac{d^3y}{dx^3}$.

So its order is 3.

The highest power raised $\dfrac{d^3y}{dx^3}$ is 2, so the degree of differential equation is 2 as well.

Answer: the degree of differential equation

$$\left(\frac{d^3y}{dx^3}\right)^2 + 2\frac{d^2y}{dx^2} - \frac{dy}{dx} + x^2\left(\frac{dy}{dx}\right)^3 = 0$$

is __2__ .