Differential equations

Determine order and degree (if defined) of differential equation

Question 1)

$\frac{d^4y}{dx^4} + \sin(y''') = 0$

Question 2)

$$y' + 5y = 0$$

Question 3)

$$\left(\frac{ds}{dt}\right)^4 + 3s\frac{d^2s}{dt^2} = 0$$

Question 4)

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

Question 5)

$$\frac{d^2y}{dx^2} = \cos 3x + \sin 3x$$

Question 6)

$$(y''')^2 + (y'')^3 + (y')^4 + y^5 = 0$$

Question 7)

$$y''' + 2y'' + y' = 0$$

Question 8)

$$y' + y = e^x$$

Question 9)

$$y'' + (y')^2 + 2y = 0$$

Question 10)

$$y'' + 2y' + \sin y = 0$$

Solutions

S.no	Order	Degree
1	The highest order derivative present in the differential equation is y''''. So, its order is four	The given differential equation is not a polynomial equation in its derivatives. Hence, its degree is not defined
2	The highest order derivative present in the differential equation is dy/dx . So, its order is one.	It is a polynomial equation in dy/dx . The highest power raised to is 1. Hence, its degree is one
3	The highest order derivative present in the given differential equation is d^2s/dt^2. So, its order is two	It is a polynomial equation in d^2s/dt^2 and ds/dt . The power raised to d^2s/dt^2

		is 1. Hence, its degree is one
4	The highest order derivative present in the given differential equation is d^2y/dx^2 . So, its order is 2	The given differential equation is not a polynomial equation in its derivatives. Hence, its degree is not defined
5	The highest order derivative present in the differential equation is d^2y/dx^2 . So, its order is two	It is a polynomial equation in d^2y/dx^2 and the power raised to d^2y/dx^2 is 1. Hence, its degree is one
6	The highest order derivative present in the differential equation is y'''. So, its order is three	The given differential equation is a polynomial equation in y''' , y'' and y' The highest power raised to is 2. Hence, its degree is 2
7	The highest order derivative present in the differential equation is y'''. So, its order is three	The given differential equation is a polynomial equation in y''' , y'' and y' The highest power raised to is 1. Hence, its degree is 1
8	The highest order derivative present in the differential equation is y'. So, its order is one.	The given differential equation is a polynomial equation in y' and the highest power raised to is one. Hence, its degree is one.
9	The highest order derivative present in the differential equation is y'' . So, its order is two.	The given differential equation is a polynomial equation in y'' and y' and the highest power raised to is one. Hence, its degree is one.
10	The highest order derivative present in the differential equation is y'' . So , its order is two.	Degree is one

Question 11)

The degree of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^2+\sin\left(\frac{dy}{dx}\right)+1=0 \text{ is}$$

(A) 3

(B) 2

(C) 1

(D) not defined

Solution

The given differential equation is not a polynomial equation in its derivatives. Therefore,

its degree is not defined.

Hence, the correct answer is D.

Question 12)

The order of the differential equation

$$2x^2\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=0 \text{ is}$$

(A) 2

(B) 1

(C) 0

(D) not defined

Solution

The highest order derivative present in the given differential equation is d^2y/dx^2 . Therefore,

its order is two.

So, the correct answer is A.