DIFFERENTIAL EQUATIONS

DIFFERENTIAL EQUATIONS WITH VARIABLES SEPARABLE

EXERCISE

Q.1 Find the solution for the given differential equation:

(1) $x^2 y\frac{dy}{dx} = (x+1)(y+1)$ (2) $\frac{dy}{dx} = e^{x+y} + x^2 e^y$

(3) $xy\frac{dy}{dx} = 1 + x + y + xy$ (4) $\frac{dy}{dx} = 1 + e^{x-y}$

(5) $\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$ (6) $\frac{dy}{dx} = x\tan(y-x) + 1$

Q.2 Determine the solution for the differential equation: $(1+x)ydx = (y-1)xdy$

Q.3 Find $e^{\frac{dy}{dx}} = x+1$, given that when $x = 0$, $y = 3$

Q.4 Evaluate $\frac{dy}{dx} = (4x+y+1)^2$

Q.5 Solve $\sin^{-1}\left(\frac{dy}{dx}\right) = x+y$

ANSWER KEY

1. (1) $y - \ln(y+1) = \ln x - \frac{1}{x} + c$ (2) $-\frac{1}{e^y} = e^x + \frac{x^3}{3} + c$

(3) $y = x + \ln|x(1+y)| + c$ (4) $e^{y-x} = x + c$

(5) $\ln\left|\tan\frac{x+y}{2} + 1\right| = x + c$ (6) $\sin(y-x) = e^{\frac{x^2}{2}+c}$

2. $xy = ce^{y-x}$

3. $y = (x+1)\log|x+1| - x + 3$

4. $\frac{1}{2}\tan^{-1}\left(\frac{4x+y+1}{2}\right) = x + c$

5. $\tan(x+y) - \sec(x+y) = x + c$