

**RD Sharma**  
**Solutions Class**  
**12 Maths**  
**Chapter 22**  
**Ex 22.6**

### Differential Equations Ex 22.6 Q1

$$\frac{dy}{dx} + \frac{1+y^2}{y} = 0, \quad y \neq 0$$

$$\frac{dy}{dx} = -\frac{1+y^2}{y}$$

$$\int \frac{y}{1+y^2} dy = -\int dx$$

$$\int \frac{2y}{1+y^2} dy = -2\int dx$$

$$\log|1+y^2| = -2x + c_1$$

$$\frac{1}{2} \log|1+y^2| + x = c$$

### Differential Equations Ex 22.6 Q2

$$\frac{dy}{dx} = \frac{1+y^2}{y^3}, \quad y \neq 0$$

$$\frac{y^3}{1+y^2} dy = dx$$

$$\int \left( y - \frac{y}{y^2+1} \right) dy = \int dx$$

$$\int y dy - \int \frac{y}{y^2+1} dy = \int dx$$

$$\int y dy - \frac{1}{2} \int \frac{2y}{y^2+1} dy = \int dx$$

$$\frac{y^2}{2} - \frac{1}{2} \log|y^2+1| = x + c$$

### Differential Equations Ex 22.6 Q3

$$\frac{dy}{dx} = \sin^2 y$$

$$\frac{dy}{\sin^2 y} = dx$$

$$\int \operatorname{cosec}^2 y dy = \int dx$$

$$-\cot x = x + c_1$$

$$x + \cot x = c$$

Differential Equations Ex 22.6 Q4

$$\begin{aligned}\frac{dy}{dx} &= \frac{1 - \cos 2y}{1 + \cos 2y} \\ &= \frac{2 \sin^2 y}{2 \cos^2 y}\end{aligned}$$

$$\frac{dy}{dx} = \tan^2 y$$

$$\frac{dy}{\tan^2 y} = dx$$

$$\int \cot^2 y dy = \int dx$$

$$\int (\operatorname{cosec}^2 y - 1) dy = \int dx$$

$$-\cot y - y + c = x$$

$$c = x + y + \cot y$$