



Exercise 7A

Question 3

$$\begin{aligned} \text{(i) LHS} &= \sin^2 \theta + \frac{1}{1 + \tan^2 \theta} \left[\because (1 + \tan^2 \theta) = \sec^2 \theta \right] \\ &= \sin^2 \theta + \frac{1}{\sec^2 \theta} \\ &= \sin^2 \theta + \cos^2 \theta = 1 = \text{RHS} \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$

$$\begin{aligned} \text{(ii) LHS} &= \frac{1}{(1 + \tan^2 \theta)} + \frac{1}{(1 + \cot^2 \theta)} \\ &= \frac{1}{\sec^2 \theta} + \frac{1}{\operatorname{cosec}^2 \theta} \left[\because (1 + \tan^2 \theta) = \sec^2 \theta \text{ or } (1 + \cot^2 \theta) = \operatorname{cosec}^2 \theta \right] \\ &= \cos^2 \theta + \sin^2 \theta = 1 = \text{RHS} \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$

Question 4

$$\begin{aligned} \text{(i) LHS} &= (1 + \cos \theta)(1 - \cos \theta)(1 + \cot^2 \theta) \\ &= (1 - \cos^2 \theta)(1 + \cot^2 \theta) \\ &= \sin^2 \theta \times \operatorname{cosec}^2 \theta \\ &\quad \left[\because (1 - \cos^2 \theta) = \sin^2 \theta \right. \\ &\quad \left. \text{and } (1 + \cot^2 \theta) = \operatorname{cosec}^2 \theta \right] \\ &= \sin^2 \theta \times \frac{1}{\sin^2 \theta} = 1 = \text{RHS} \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$

$$\begin{aligned} \text{(ii) LHS} &= \operatorname{cosec} \theta (1 + \cos \theta)(\operatorname{cosec} \theta - \cot \theta) \\ &= \left(\operatorname{cosec} \theta + \frac{\cos \theta}{\sin \theta} \right) (\operatorname{cosec} \theta - \cot \theta) \\ &= (\operatorname{cosec} \theta + \cot \theta)(\operatorname{cosec} \theta - \cot \theta) \\ &= (\operatorname{cosec}^2 \theta - \cot^2 \theta) = 1 = \text{RHS} \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$

***** END *****

