



Exercise 7A

Question 12

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

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

Question 13

$$\begin{aligned}
 \text{LHS} &= (1 + \tan^2 \theta)(1 + \cot^2 \theta) \\
 &= \sec^2 \theta \cos \operatorname{csc}^2 \theta \\
 &= \frac{1}{\sin^2 \theta \cos^2 \theta} = \frac{1}{\sin^2 \theta (1 - \sin^2 \theta)} \\
 &= \frac{1}{\sin^2 \theta - \sin^4 \theta} = \text{RHS}
 \end{aligned}$$

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

Question 14

$$\begin{aligned}
 &\frac{\tan \theta}{(1 + \tan^2 \theta)^2} + \frac{\cot \theta}{(1 + \cot^2 \theta)^2} \\
 &= \frac{\tan \theta}{(\sec^2 \theta)^2} + \frac{\cot \theta}{(\operatorname{csc}^2 \theta)^2} \\
 &= \frac{\sin \theta}{\cos \theta} \times \frac{1}{\sec^4 \theta} + \frac{\cos \theta}{\sin \theta} \times \frac{1}{\operatorname{csc}^4 \theta} \\
 &= \frac{\sin \theta}{\cos \theta} \times \cos^4 \theta + \frac{\cos \theta}{\sin \theta} \times \sin^4 \theta \\
 &= \sin \theta \cos^3 \theta + \cos \theta \sin^3 \theta \\
 &= \sin \theta \cos \theta (\cos^2 \theta + \sin^2 \theta) \\
 &= \sin \theta \cos \theta = \text{RHS}
 \end{aligned}$$

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

***** END *****

