



Exercise 7A

Question 30

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

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

Question 31

$$\begin{aligned}
 \text{LHS} &= (1 + \tan \theta + \cot \theta)(\sin \theta - \cos \theta) \\
 &= \left(1 + \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta}\right)(\sin \theta - \cos \theta) \\
 &= \left(\frac{\cos \theta \sin \theta + \sin^2 \theta + \cos^2 \theta}{\cos \theta \sin \theta}\right)(\sin \theta - \cos \theta) \\
 &= \frac{(\cos \theta \sin \theta + 1)}{\cos \theta \sin \theta}(\sin \theta - \cos \theta) \\
 \text{RHS} &= \left(\frac{\sec \theta}{\operatorname{cosec}^2 \theta} - \frac{\operatorname{cosec} \theta}{\sec^2 \theta}\right) = \left(\frac{\frac{1}{\cos \theta}}{\frac{1}{\sin^2 \theta}} - \frac{\frac{1}{\sin \theta}}{\frac{1}{\cos^2 \theta}}\right) \\
 &= \left(\frac{\sin^2 \theta}{\cos \theta} - \frac{\cos^2 \theta}{\sin \theta}\right) = \frac{\sin^3 \theta - \cos^3 \theta}{\cos \theta \sin \theta} \\
 &= \frac{(\sin \theta - \cos \theta)(\sin^2 \theta + \cos^2 \theta + \cos \theta \sin \theta)}{\cos \theta \sin \theta} \\
 &\quad \left[\because a^3 - b^3 = (a - b)(a^2 + ab + b^2)\right] \\
 &= \frac{(\sin \theta - \cos \theta)(1 + \cos \theta \sin \theta)}{\cos \theta \sin \theta}
 \end{aligned}$$

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

***** END *****