



Exercise 7A

Question 9

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

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

Question 10

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

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

Question 11

$$\frac{\tan^2 \theta}{(1 + \tan^2 \theta)} + \frac{\cot^2 \theta}{(1 + \cot^2 \theta)}$$

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

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

***** END *****