



Exercise 7A

Question 17

$$\text{LHS} = \frac{1 + \tan^2 \theta}{1 + \cot^2 \theta} = \frac{\left(1 + \frac{\sin^2 \theta}{\cos^2 \theta}\right)}{\left(1 + \frac{\cos^2 \theta}{\sin^2 \theta}\right)} = \frac{\frac{(\cos^2 \theta + \sin^2 \theta)}{\cos^2 \theta}}{\frac{(\sin^2 \theta + \cos^2 \theta)}{\sin^2 \theta}}$$

$$= \frac{\left(\frac{1}{\cos^2 \theta}\right)}{\left(\frac{1}{\sin^2 \theta}\right)} = \frac{\sin^2 \theta}{\cos^2 \theta} = \tan^2 \theta$$

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

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

Question 18

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

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

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

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

\*\*\*\*\* END \*\*\*\*\*