

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

$$\begin{aligned}
 50 \text{ (ii)} & \stackrel{\text{LHS}}{=} \frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} \\
 &= \frac{\tan \theta}{1 - \frac{1}{\tan \theta}} + \frac{\frac{1}{\tan \theta}}{1 - \tan \theta} \\
 &= \frac{\tan \theta}{\frac{\tan \theta - 1}{\tan \theta}} + \frac{1}{\tan \theta(1 - \tan \theta)} \\
 &= \frac{\tan^2 \theta}{\tan \theta - 1} + \frac{1}{\tan \theta(1 - \tan \theta)} \\
 &= \frac{\tan^2 \theta}{\tan \theta - 1} - \frac{1}{\tan \theta(\tan \theta - 1)} \\
 &= \frac{\tan^3 \theta - 1}{\tan \theta(\tan \theta - 1)} \\
 &= \frac{(\cancel{\tan \theta - 1})(\tan^2 \theta + 1 + \tan \theta)}{\tan \theta(\cancel{\tan \theta - 1})} \\
 &= \frac{\sec^2 \theta + \cancel{\tan \theta}}{\tan \theta \cancel{\tan \theta}} \\
 &= \frac{\frac{1}{\cos^2 \theta}}{\frac{\sin \theta}{\cos \theta}} + 1 \\
 &= \frac{1}{\cos \theta \sin \theta} + 1 \\
 &= \sec \theta \operatorname{cosec} \theta + 1 \\
 &= \text{RHS}
 \end{aligned}$$

$$\begin{aligned}
 50 \text{ (iii)} & \stackrel{\text{LHS}}{=} \frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} \\
 &= \frac{\cos^2 A + (1 + \sin A)^2}{\cos A(1 + \sin A)} \\
 &= \frac{\cos^2 A + 1 + \sin^2 A + 2 \sin A}{\cos A(1 + \sin A)} \\
 &= \frac{1 + 1 + 2 \sin A}{\cos A(1 + \sin A)} \\
 &= \frac{2 + 2 \sin A}{\cos A(1 + \sin A)} \\
 &= \frac{2(1 + \sin A)}{\cos A(1 + \sin A)} \\
 &= 2 \sec A \\
 &= \text{RHS}
 \end{aligned}$$