

Exercise 7A

Question 12

LHS = 
$$\frac{\left(1 + \tan^2 \theta\right) \cot \theta}{\cos \sec^2 \theta} = \frac{\sec^2 \theta \cot \theta}{\cos \sec^2 \theta}$$
  
 $\left[\because \left(1 + \tan^2 \theta\right) = \sec^2 \theta\right]$   
=  $\frac{1}{\cos^2 \theta} \times \frac{\cos \theta}{\sin \theta} \times \sin^2 \theta = \frac{\sin \theta}{\cos \theta}$   
=  $\tan \theta = RHS$ 

Question 13

LHS = 
$$(1 + \tan^2 \theta)(1 + \cot^2 \theta)$$
  
=  $\sec^2 \theta \csc^2 \theta$   
=  $\frac{1}{\sin^2 \theta \cos^2 \theta} = \frac{1}{\sin^2 \theta (1 - \sin^2 \theta)}$   
=  $\frac{1}{\sin^2 \theta - \sin^4 \theta} = RHS$ 

Question 14

: LHS = RHS

: LHS = RHS

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