Exercise 7A

Question 9

$$\text{LHS} = \frac{\cos^2\theta}{(1-\tan\theta)} + \frac{\sin^3\theta}{(\sin\theta-\cos\theta)}$$

$$\frac{\cos^2\theta}{\left(1-\frac{\sin\theta}{\cos\theta}\right)} + \frac{\sin^3\theta}{(\sin\theta-\cos\theta)}$$

$$= \frac{\cos^3\theta}{(\cos\theta-\sin\theta)} + \frac{\sin^3\theta}{(\sin\theta-\cos\theta)}$$

$$= \frac{\cos^3\theta}{(\cos\theta-\sin\theta)} - \frac{\sin^3\theta}{\cos\theta-\sin\theta}$$

$$= \frac{\cos^3\theta-\sin^3\theta}{(\cos\theta-\sin\theta)}$$

$$= \frac{(\cos\theta-\sin\theta)\left(\cos^2\theta+\cos\theta\sin\theta+\sin^2\theta\right)}{(\cos\theta-\sin\theta)}$$

$$\left[\because a^3-b^3=(a-b)\left(a^2+ab+b^2\right)\right]$$

$$= (1+\cos\theta\sin\theta) = \text{RHS}$$

$\therefore$ LHS = RHS

Question 10

$$\text{LHS} = \frac{\cos\theta}{(1-\tan\theta)} - \frac{\sin^2\theta}{(\cos\theta-\sin\theta)}$$

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

$$= \frac{\cos^2\theta}{(\cos\theta-\sin\theta)} - \frac{\sin^2\theta}{(\cos\theta-\sin\theta)} = \frac{\cos^2\theta-\sin^2\theta}{(\cos\theta-\sin\theta)}$$

$$= \frac{(\cos\theta-\sin\theta)(\cos\theta+\sin\theta)}{(\cos\theta-\sin\theta)} = (\cos\theta+\sin\theta) = \text{RHS}$$

$\therefore$ LHS = RHS

Question 11

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

$$\text{LHS}=\frac{\tan^2\theta}{\sec^2\theta}+\frac{\cot^2\theta}{\operatorname{cosec}^2\theta}$$

$$\left[\because\left(1+\tan^2\theta\right)=\sec^2\theta \text{ and } \left(1+\cot^2\theta\right)=\operatorname{cosec}^2\theta\right]$$

$$=\frac{\frac{\sin^2\theta}{\cos^2\theta}}{\frac{1}{\cos^2\theta}}+\frac{\frac{\cos^2\theta}{\sin^2\theta}}{\frac{1}{\sin^2\theta}}$$

$$=\sin^2\theta+\cos^2\theta=1=\text{RHS}$$

$\therefore$ LHS = RHS

********** END **********