Exercise 7A

Question 20

(i)

$$\frac{\sec\theta-1}{\sec\theta+1}=\frac{\left(\frac{1}{\cos\theta}-1\right)}{\left(\frac{1}{\cos\theta}+1\right)}=\frac{1-\cos\theta}{1+\cos\theta}$$

$$=\frac{(1-\cos\theta)}{(1+\cos\theta)}\times\frac{(1+\cos\theta)}{(1+\cos\theta)}=\frac{1-\cos^2\theta}{(1+\cos\theta)^2}$$

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

$\therefore$ LHS = RHS

(ii)

$$\text{LHS}=\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta}=\frac{\left(\frac{1}{\cos\theta}-\frac{\sin\theta}{\cos\theta}\right)}{\left(\frac{1}{\cos\theta}+\frac{\sin\theta}{\cos\theta}\right)}$$

$$=\frac{(1-\sin\theta)}{(1+\sin\theta)}$$

$$=\frac{(1-\sin\theta)}{(1+\sin\theta)}\times\frac{(1+\sin\theta)}{(1+\sin\theta)}=\frac{1-\sin^2\theta}{(1+\sin\theta)^2}$$

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

$\therefore$ LHS = RHS

Question 21

$$\text{LHS}=\frac{\sin\theta}{\cot\theta+\operatorname{cosec}\theta}-\frac{\sin\theta}{\cot\theta-\operatorname{cosec}\theta}$$

$$=\frac{\sin\theta}{\operatorname{cosec}\theta+\cot\theta}+\frac{\sin\theta}{\operatorname{cosec}\theta-\cot\theta}$$

$$=\frac{\sin\theta(\operatorname{cosec}\theta-\cot\theta)+\sin\theta(\operatorname{cosec}\theta+\cot\theta)}{\operatorname{cosec}^2\theta-\cot^2\theta}$$

$$=\sin\theta(\operatorname{cosec}\theta-\cot\theta)+\sin\theta(\operatorname{cosec}\theta+\cot\theta)$$

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

$$=2\sin\theta\operatorname{cosec}\theta=2\sin\theta\times\frac{1}{\sin\theta}=2=\text{RHS}$$

$\therefore$ LHS = RHS

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