



Exercise 7A

Question 27

(i)

$$\text{LHS} = \frac{1 + \cos \theta + \sin \theta}{1 + \cos \theta - \sin \theta}$$

On dividing the numerator and denominator of LHS by $\cos \theta$, We get

$$\begin{aligned} \text{LHS} &= \frac{\sec \theta + 1 + \tan \theta}{\sec \theta + 1 - \tan \theta} \\ &= \frac{(\sec \theta + \tan \theta) + (\sec^2 \theta - \tan^2 \theta)}{1 + \sec \theta - \tan \theta} \end{aligned}$$

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

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

(ii)

$$\text{LHS} = \frac{\sin \theta + 1 - \cos \theta}{\cos \theta - 1 + \sin \theta}$$

On dividing the numerator and denominator of LHS by $\cos \theta$, We get

$$\begin{aligned} \text{LHS} &= \frac{\tan \theta + \sec \theta - 1}{1 - \sec \theta + \tan \theta} \\ &= \frac{(\tan \theta + \sec \theta) - (\sec^2 \theta - \tan^2 \theta)}{(1 - \sec \theta + \tan \theta)} \\ &\quad \left(\text{writing } 1 = \sec^2 \theta - \tan^2 \theta \right) \\ &= \frac{(\tan \theta + \sec \theta) - (\sec \theta + \tan \theta)(\sec \theta - \tan \theta)}{(1 - \sec \theta + \tan \theta)} \end{aligned}$$

$$\begin{aligned} &= \frac{(\tan \theta + \sec \theta)(1 - \sec \theta + \tan \theta)}{(1 - \sec \theta + \tan \theta)} \\ &= \tan \theta + \sec \theta = \frac{\sin \theta}{\cos \theta} + \frac{1}{\cos \theta} = \frac{\sin \theta + 1}{\cos \theta} = \text{RHS} \end{aligned}$$

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

***** END *****

