Question 28

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

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

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

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

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

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

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

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

Question 29

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

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

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

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

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

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

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

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

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