Question 24

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

$$= 1 + \sin^2\theta - 2\sin\theta + \cos^2\theta + 2\cos\theta - 2\cos\theta\sin\theta$$
$$= 1 + 1 - 2\sin\theta + 2\cos\theta - 2\cos\theta\sin\theta$$
$$= 2(1 - \sin\theta) + 2\cos\theta(1 - \sin\theta)$$
$$= (1 - \sin\theta)(2 + 2\cos\theta)$$
$$= 2(1 - \sin\theta)(1 + \cos\theta) = RHS$$

$\therefore$ LHS = RHS

Question 25

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

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

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

$\therefore$ LHS = RHS

Question 26

(i)

$$\text{LHS} = \frac{(\cos ec\,\theta + \cot\theta)}{(\cos ec\,\theta - \cot\theta)} \times \frac{(\cos ec\,\theta + \cot\theta)}{(\cos ec\,\theta + \cot\theta)}$$

$$= \frac{(\cos ec\,\theta + \cot\theta)^2}{(\cos ec^2\,\theta - \cot^2\,\theta)} = (\cos ec\,\theta + \cot\theta)^2$$

Further,

$$(\cos ec\,\theta + \cot\theta)^2 = \cos ec^2\,\theta + \cot^2\,\theta + 2\cos ec\,\theta\,\cot\theta$$

$$= 1 + \cot^2\,\theta + \cot^2\,\theta + 2\cos ec\,\theta\,\cot\theta$$

$$= 1 + 2\cot^2\,\theta + 2\cos ec\,\theta\,\cot\theta$$

∴ LHS = RHS

(ii)

$$\text{LHS} = \frac{(\sec\theta + \tan\theta)}{(\sec\theta - \tan\theta)} \times \frac{(\sec\theta + \tan\theta)}{(\sec\theta + \tan\theta)}$$

$$= \frac{(\sec\theta + \tan\theta)^2}{(\sec^2\theta - \tan^2\theta)} = (\sec\theta + \tan\theta)^2$$

Further,

$$(\sec\theta + \tan\theta)^2 = \sec^2\theta + \tan^2\theta + 2\sec\theta\tan\theta$$

$$= 1 + \tan^2\theta + \tan^2\theta + 2\sec\theta\tan\theta$$

$$= 1 + 2\tan^2\theta + 2\sec\theta\tan\theta = \text{RHS}$$

∴ LHS = RHS

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