Chapter 5 Trigonometric Functions Ex 5.3 Q 3.i

$$\text{LHS} = \frac{\cos\left(2\pi+\theta\right)\operatorname{cosec}\left(2\pi+\theta\right)\tan\left(\frac{\pi}{2}+\theta\right)}{\sec\left(\frac{\pi}{2}+\theta\right)\cos\theta\cot\left(\pi+\theta\right)}$$

$$= \frac{\cos\theta\times\operatorname{cosec}\theta\left(-\cot\theta\right)}{-\operatorname{cosec}\theta.\cos\theta\cot\theta} \qquad \left(\because \tan\left(\frac{\pi}{2}+\theta\right) = -\cot\theta \;\&\; \sec\left(\frac{\pi}{2}+\theta\right) = -\operatorname{cosec}\theta\right)$$

$$= 1$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 3.ii

$$\text{LHS} = \frac{\operatorname{cosec}\left(90^\circ+\theta\right)+\cot\left(450^\circ+\theta\right)}{\operatorname{cosec}\left(90^\circ-\theta\right)+\tan\left(180^\circ-\theta\right)} + \frac{\tan\left(180^\circ+\theta\right)+\sec\left(180^\circ-\theta\right)}{\tan\left(360^\circ+\theta\right)-\sec\left(-\theta\right)}$$

$$= \frac{\sec\theta+\cot\left(2\pi+\frac{\pi}{2}+\theta\right)}{\sec\theta-\tan\theta} + \frac{\tan\theta-\sec\theta}{\tan\theta-\sec\theta}$$

$$\left(\because \operatorname{cosec}\left(90^\circ+\theta\right) = \sec\theta, \operatorname{cosec}\left(90^\circ+\theta\right) = \sec\theta, \tan\left(180^\circ-\theta\right) = -\tan\theta\sec\left(-\theta\right) = \sec\theta\right)$$

$$= \frac{\sec\theta+\cot\left(\frac{\pi}{2}+\theta\right)}{\sec\theta-\tan\theta} + 1 \qquad \left(\because \cot\left(2\pi+\theta\right) = \cot\theta\right)$$

$$= \frac{\sec\theta-\tan\theta}{\sec\theta-\tan\theta} + 1 \qquad \left(\because \cot\left(\frac{\pi}{2}+\theta\right) = -\tan\theta\right)$$

$$= 1+1$$

$$= 2$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 3.iii

$$\text{LHS} = \frac{\sin\left(180^\circ+\theta\right)\cos\left(90^\circ+\theta\right)\tan\left(270^\circ-\theta\right)\cot\left(360^\circ-\theta\right)}{\sin\left(360^\circ-\theta\right)\cos\left(360^\circ+\theta\right)\operatorname{cosec}\left(-\theta\right)\sin\left(270^\circ+\theta\right)}$$

$$= \frac{\sin\theta\left(-\sin\theta\right)\cot\theta\left(-\cot\theta\right)}{-\sin\theta\cos\theta\left(-\operatorname{cosec}\theta\right)\left(-\cos\theta\right)} \qquad \left(\because \tan\left(270^\circ-\theta\right) = \cot\theta \;\&\; \sin\left(270^\circ+\theta\right) = -\cos\theta\right)$$

$$= \frac{-\sin\theta\times\sin\theta\times\cos\theta\times\cos\theta\times\sin\theta}{-\sin\theta\times\cos\theta\times\sin\theta\times\sin\theta\times\cos\theta} \qquad \left(\because \cot\theta = \frac{\cos\theta}{\sin\theta} \;\&\; \operatorname{cosec}\theta = \frac{1}{\sin\theta}\right)$$

$$= 1$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 3.iv

$$\text{LHS} = \left\{1+\cot\theta - \sec\left(\frac{\pi}{2}+\theta\right)\right\}\left\{1+\cot\theta+\sec\left(\frac{\pi}{2}+\theta\right)\right\}$$

$$= \left\{1+\cot\theta-(-\operatorname{cosec}\theta)\right\}\left\{1+\cot\theta-\operatorname{cosec}\theta\right\}$$

$$\left(\because \sec\left(\frac{\pi}{2}+\theta\right) = -\operatorname{cosec}\theta\right)$$

$$= \left\{(1+\cot\theta)+\operatorname{cosec}\theta\right\}\left\{(1+\cot\theta)-\operatorname{cosec}\theta\right\}$$

$$= (1+\cot\theta)^2 - \operatorname{cosec}^2\theta$$

$$= 1+\cot^2\theta+2\cot\theta-\operatorname{cosec}^2\theta$$

$$= \operatorname{cosec}^2+2\cot\theta-\operatorname{cosec}^2 \quad \left(\because 1+\cot^2\theta = \operatorname{cosec}^2\theta\right)$$

$$= 2\cot\theta$$

= RHS

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 3 v

$$\text{LHS} = \frac{\tan\left(90^\circ-\theta\right)\sec\left(180^\circ-\theta\right)\sin\left(-\theta\right)}{\sin\left(180^\circ+\theta\right)\cot\left(360^\circ-\theta\right)\operatorname{cosec}\left(90^\circ-\theta\right)}$$

$$= \frac{\cot\theta\times(-\sec\theta)\times(-\sin\theta)}{-\sin\theta\times(-\cot\theta)\times\sec\theta}$$

= 1

= RHS

Proved

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