Chapter 5 Trigonometric Functions Ex 5.3 Q 2.i

$\text{LHS} = \tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ$

$= \tan\left(\pi + \frac{\pi}{4}\right)\cot\left(2\pi + \frac{\pi}{4}\right) + \tan\left(4\pi + \frac{\pi}{4}\right)\cot\left(4\pi - \frac{\pi}{4}\right)$

$= \tan\frac{\pi}{4}.\ \cot\frac{\pi}{4} + \tan\frac{\pi}{4} \times \left(-\cot\frac{\pi}{4}\right) \qquad \left(\because \cot\left(4\pi - \frac{\pi}{4}\right) = -\cot\frac{\pi}{4}\right)$

$= 1.1 + 1.(-1)$

$= 0$

$= \text{RHS}$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 2.ii

$\text{LHS} = \sin\frac{8\pi}{3}\cos\frac{23\pi}{6} + \cos\frac{13\pi}{3}\sin\frac{35\pi}{6}$

$= \sin\left(3\pi - \frac{\pi}{3}\right)\cos\left(4\pi - \frac{\pi}{6}\right) + \cos\left(4\pi + \frac{\pi}{3}\right)\sin\left(6\pi - \frac{\pi}{6}\right)$

$= \sin\frac{\pi}{3}\cos\frac{\pi}{6} + \cos\frac{\pi}{3}\left(-\sin\frac{\pi}{6}\right) \qquad \left(\because \sin(6\pi - \theta) = -\sin\theta\right)$

$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{22} + \frac{1}{2} \times \left(\frac{-1}{2}\right)$

$= \frac{3}{4} - \frac{1}{4}$

$= \frac{2}{4}$

$= \frac{1}{2}$

$= \text{RHS}$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 2.iii

$\text{LHS} = \cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ$

$= \cos 24^\circ + \cos 204^\circ + \cos 55^\circ + \cos 125^\circ + \cos 300^\circ$

$= \cos 24^\circ + \cos\left(\pi + 24^\circ\right) + \cos 55^\circ + \cos\left(\pi - 55^\circ\right) + \cos\left(2\pi - \frac{\pi}{3}\right)$

$= \cos 24^\circ - \cos 24^\circ + \cos 55^\circ - \cos 55^\circ + \cos\frac{\pi}{3}$

$= \cos\frac{\pi}{3}$

$= \frac{1}{2}$

$= \text{RHS}$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 1 2.iv

$\text{LHS} = \tan\left(-225^\circ\right)\cot\left(-405^\circ\right) - \tan\left(-765^\circ\right)\cot\left(675^\circ\right)$

$= -\tan 225^\circ\left(-\cot 405^\circ\right) + \tan 765^\circ \cot 765^\circ \qquad \left(\because \tan(-\theta) = -\tan\theta \ \&\ \cot(-\theta) = -\cot\theta\right)$

$= \tan\left(\pi + \frac{\pi}{4}\right)\cot\left(2\pi\frac{\pi}{4}\right) + \tan\left(4\pi + \frac{\pi}{4}\right)\cot\left(4\pi - \frac{\pi}{4}\right)$

$= \tan\frac{\pi}{4}\cot\frac{\pi}{4} + \tan\frac{\pi}{4} \times \left(-\cot\frac{\pi}{4}\right) \qquad \left(\because \cot(4\pi - \theta) = -\cot\theta\right)$

$= 1.1 + 1(-1)$

$= 1 - 1$

$= 0$

$= \text{RHS}$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 2.v

$$\text{LHS} = \cos 570^\circ \sin 510^\circ + \sin(-330^\circ)\cos(-390^\circ)$$

$$= \cos\left(3\pi + \frac{\pi}{6}\right)\sin\left(3\pi - \frac{\pi}{6}\right) - \sin 330^\circ \cos 390^\circ \qquad \left(\because \begin{array}{l}\sin(-\theta) = -\sin\theta \text{ and} \\ \cos(-\theta) = \cos\theta\end{array}\right)$$

$$= -\cos\frac{\pi}{6}\sin\frac{\pi}{6} - \sin\left(2\pi - \frac{\pi}{6}\right)\cos\left(2\pi + \frac{\pi}{6}\right)$$

$$= -\sin\frac{\pi}{6}\cos\frac{\pi}{6} + \sin\frac{\pi}{6}.\cos\frac{\pi}{6} \qquad (\because \sin(2\pi - \theta) = -\sin\theta)$$

$$= 0$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 2.vi

$$\text{LHS} = \tan\frac{11\pi}{3} - 2\sin\frac{4\pi}{6} - \frac{3}{4}\cos ec^2\frac{\pi}{4} + 4\cos^2\frac{17\pi}{6}$$

$$= \tan\left(4\pi - \frac{\pi}{3}\right) - 2\sin\frac{2\pi}{3} - \frac{3}{4} \times \left(\sqrt{2}\right)^2 + 4\cos^2\left(3\pi - \frac{\pi}{6}\right)$$

$$= -\tan\frac{\pi}{3} - 2\sin\left(\pi - \frac{\pi}{3}\right) - \frac{3}{4} \times 2 + 4\cos^2\frac{\pi}{6}$$

$$\left(\because \tan\left(4\pi - \frac{\pi}{3}\right) = -\tan\frac{\pi}{3}, \cos\left(3\pi - \frac{\pi}{6}\right) = -\cos\frac{\pi}{6}\right)$$

$$= -\sqrt{3} - 2\sin\frac{\pi}{3} - \frac{3}{2} + 4 \times \left(\frac{\sqrt{3}}{2}\right)^2$$

$$= -\sqrt{3} - 2 \times \frac{\sqrt{3}}{2} - \frac{3}{2} + 4 \times \frac{3}{4}$$

$$= -\sqrt{3} - \sqrt{3} - \frac{3}{2} + 3$$

$$= -2\sqrt{3}\,\frac{-3+6}{2}$$

$$= -2\sqrt{3} + \frac{3}{2}$$

$$= \frac{3 - 4\sqrt{3}}{2}$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 2.vii

$$\text{LHS} = 3\sin\frac{\pi}{6}\sec\frac{\pi}{3} - 4\sin\frac{5\pi}{6}\cot\frac{\pi}{4}$$

$$= 3 \times \frac{1}{2} \times 2 - 4\sin\left(\pi - \frac{\pi}{6}\right) \times 1$$

$$= 3 - 4\sin\frac{\pi}{6} \qquad (\because \sin(\pi - \theta) = \sin\theta)$$

$$= 3 - 4 \times \frac{1}{2}$$

$$= 3 - 2$$

$$= 1$$

$$= \text{RHS}$$

Proved

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