Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 6

LHS,

$$\frac{\sin\theta+\sin 2\theta}{1+\cos\theta+\cos 2\theta}$$

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

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

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

$$=\frac{\sin\theta}{\cos\theta}$$

$$=\tan\theta$$

$$=\text{RHS}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 7

LHS,

$$\frac{\cos 2\theta}{1+\sin 2\theta}$$

$$=\frac{\cos^2\theta-\sin^2\theta}{\sin^2+\cos^2\theta+2\sin\theta\cos\theta} \qquad \left[\because \cos 2\theta=\cos^2\theta-\sin^2\theta \;\&\; \sin^2\theta+\cos^2\theta=1\right]$$

$$=\frac{(\cos\theta-\sin\theta)(\cos\theta+\sin\theta)}{(\cos\theta+\sin\theta)^2} \qquad \left[\because a^2-b^2=(a+b)(a-b)\right]$$

$$=\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$$

Dividing numerator and denomenator by $\cos\theta$

$$=\frac{1-\tan\theta}{1+\tan\theta}$$

$$=\tan\left(\pi/4-\theta\right)=\text{RHS}$$

Note: $\tan\left(\pi/4-\theta\right)=\frac{\tan\pi/4-\tan\theta}{1+\tan\pi/4\tan\theta}$

$$=\frac{1-\tan\theta}{1+\tan\theta}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 8

$$\frac{\cos\theta}{1-\sin\theta}$$

$$= \frac{\cos^2\theta/2 - \sin^2\theta/2}{\sin^2\theta/2 + \cos^2\theta/2 \quad -2\sin\theta/2.\cos\theta/2} \qquad \left[\because \cos 2A = \cos^2 A - \sin^2 A \ \& \ \sin^2 A + \cos^2 A = 1\right]$$

$$= \frac{\left(\cos\theta/2 - \sin\theta/2\right)\left(\cos\theta/2 + \sin\theta/2\right)}{\left(\cos\theta/2 - \sin\theta/2\right)^2}$$

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

Dividing numerator and denominator by $\cos\theta/2$

$$= \frac{1+\tan\theta/2}{1-\tan\theta/2}$$

$$= \tan\left(\pi/4 + \theta/2\right) = \text{RHS}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 9

LHS,

$$\cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8} + \cos^2\frac{5\pi}{8} + \cos^2\frac{7\pi}{8}$$

$$= \cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8} + \cos^2\left(\pi - \frac{3\pi}{8}\right) + \cos^2\left(\pi - \frac{\pi}{8}\right)$$

$$= \cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8} + \cos^2\frac{3\pi}{8} + \cos^2\frac{\pi}{8}$$

$$= 2\left(\cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8}\right)$$

$$= 2\left(\cos^2\frac{\pi}{8} + \cos^2\left(\frac{\pi}{2} - \frac{\pi}{8}\right)\right)$$

$$= 2\left(\cos^2\frac{\pi}{8} + \sin^2\frac{\pi}{8}\right)$$

$$= 2$$

$$= \text{RHS}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 10

LHS,

$$\sin^2\frac{\pi}{8}+\sin^2\frac{3\pi}{8}+\sin^2\frac{5\pi}{8}+\sin^2\frac{7\pi}{8}$$

$$=\sin^2\frac{\pi}{8}+\sin^2\left(\frac{\pi}{2}-\frac{\pi}{8}\right)+\sin^2\frac{5\pi}{8}+\sin^2\left(\pi-\frac{\pi}{8}\right)$$

$$=\sin^2\frac{\pi}{8}+\cos^2\frac{\pi}{8}+\sin^2\left(\pi-\frac{3\pi}{8}\right)+\sin^2\frac{\pi}{8}$$

$$=1+\sin^2\frac{3\pi}{8}+\sin^2\frac{\pi}{8}$$

$$=1+\sin^2\left(\frac{\pi}{2}-\frac{\pi}{8}\right)+\sin^2\frac{\pi}{8}$$

$$=1+\cos^2\frac{\pi}{8}+\sin^2\frac{\pi}{8}$$

$$=1+1$$

$$=2$$

= RHS

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