

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

LHS,

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

$$=\frac{\sin\theta+2\sin\theta.\cos\theta}{\cos\theta+\left(1+\cos2\theta\right)}$$

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

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

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

$$= tan \theta$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex  $9.1 \, \mathrm{Q} \, 7$  LHS,

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

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

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

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

Dividing numerator and denomenator by  $\cos \theta$ 

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

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

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

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

$$= \frac{\cos^2\theta_2' - \sin^2\theta_2'}{\sin^2\theta_2' + \cos^2\theta_2' - 2\sin\theta_2' \cdot \cos\theta_2'} \qquad \left[\because \cos 2A = \cos^2 A - \sin^2 A & 8\right]$$

$$= \frac{(\cos\theta_2' - \sin\theta_2')(\cos\theta_2' + \sin\theta_2')}{(\cos\theta_2' - \sin\theta_2')^2}$$

$$= \frac{\cos\theta_2' + \sin\theta_2'}{\cos\theta_2' - \sin\theta_2'}$$

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

$$= \frac{1 + \tan \frac{\theta}{2}}{1 - \tan \frac{\theta}{2}}$$
$$= \tan \left(\frac{\pi}{4} + \frac{\theta}{3}\right) = \text{RHS}$$

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

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

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

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

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

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

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

$$= 2$$

$$= RHS$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q 10  $\,$ 

= RHS

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

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

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

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

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

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

$$= 1 + 1$$

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