Chapter 5 Trigonometric Functions Ex 5.3 Q 7

$\because$ A, B, C, D are the angles of a cyclic quadrilateral in order,

$\therefore$ $A + C = \pi$ & $B + D = \pi$

$\Rightarrow$ $\pi - A = C$ & $\pi - D = B$

$\Rightarrow$ $\cos(\pi - A) = \cos C$ .....(i)

& $\cos(\pi - D) = \cos B$ .....(ii)

Now, $\cos(180^\circ - A) + \cos(180^\circ + B) + (180^\circ + C) - \sin(90^\circ + D)$

$= \cos C + (-\cos B) - \cos C - \cos D$

$(\because \cos(180^\circ + B) = -\cos B, \cos(180^\circ + C) = -\cos C$ & using (i))

$= -\cos B - \cos D$

$= -\cos B - (-\cos B)$ (using (ii))

$= -\cos B + \cos B$

$= 0$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 8i.

$$\operatorname{cosec}(90^\circ + \theta) + x \cos\theta \cot(90^\circ + \theta) = \sin(90^\circ + \theta)$$

$$\Rightarrow \quad \sec\theta + x \cos\theta \times (-\tan\theta) = \cos\theta$$

$$\Rightarrow \quad \frac{1}{\cos\theta} + x \cos\theta \times \frac{(-\sin\theta)}{\cos\theta} = \cos\theta$$

$$\Rightarrow \quad \frac{1}{\cos\theta} - x \sin\theta = \cos\theta$$

$$\Rightarrow \quad \frac{1 - x \sin\theta \cos\theta}{\cos\theta} = \cos\theta$$

$$\Rightarrow \quad 1 - x \sin\theta \cos\theta = \cos^2\theta$$

$$\Rightarrow \quad 1 - \cos^2\theta = x \sin\theta \cos\theta$$

$$\Rightarrow \quad \sin^2\theta = x \sin\theta \cos\theta$$

$$\Rightarrow \quad \sin\theta = x \cos\theta$$

$$\Rightarrow \quad x = \frac{\sin\theta}{\cos\theta}$$

$$= \tan\theta$$

Hence $x = \tan\theta$

Chapter 5 Trigonometric Functions Ex 5.3 Q 8. ii.

We have $x \cot(90^\circ + \theta) + \tan(90^\circ + \theta) \sin\theta + \operatorname{cosec}(90^\circ + \theta) = 0$

$\Rightarrow \quad x(-\tan\theta) - \cot\theta \times \sin\theta + \sec\theta = 0$

$\Rightarrow \quad -x\tan\theta - \frac{\cos\theta}{\sin\theta} \times \sin\theta + \frac{1}{\cos\theta} = 0$

$\Rightarrow \quad -x\frac{\sin\theta}{\cos\theta} - \cos\theta + \frac{1}{\cos\theta} = 0$

$\Rightarrow \quad \frac{-x\sin\theta - \cos^2\theta + 1}{\cos\theta} = 0$

$\Rightarrow \quad -x\sin\theta + 1 - \cos^2\theta = 0$

$\Rightarrow \quad -x\sin\theta + \sin^2\theta = 0$

$\Rightarrow \quad x\sin\theta = \sin^2\theta$

$\Rightarrow \quad x = \frac{\sin^2\theta}{\sin\theta}$

$\Rightarrow \quad x = \sin\theta$

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