Exercise 7B

Question 4:

$$(\sec\theta + \tan\theta) = m, (\sec\theta - \tan\theta) = n$$

$$LHS = mn = (\sec\theta + \tan\theta)(\sec\theta - \tan\theta)$$

$$= \sec^2\theta - \tan^2\theta = 1 = RHS$$

∴ LHS = RHS

Question 5:

$$(\operatorname{cosec}\theta + \cot\theta) = m, (\operatorname{cosec}\theta - \cot\theta) = n$$

$$LHS = mn = (\operatorname{cosec}\theta + \cot\theta) \times (\operatorname{cosec}\theta - \cot\theta)$$

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

∴ LHS = RHS

Question 6:

$$x = a\cos^3\theta, y = b\sin^3\theta$$

$$LHS = \left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} = \left(\frac{a\cos^3\theta}{a}\right)^{\frac{2}{3}} + \left(\frac{b\sin^3\theta}{b}\right)^{\frac{2}{3}}$$

$$= (\cos^3\theta)^{\frac{2}{3}} + (\sin^3\theta)^{\frac{2}{3}} = (\cos\theta)^{3\times\frac{2}{3}} + (\sin\theta)^{3\times\frac{2}{3}}$$

$$= \cos^2\theta + \sin^2\theta = 1 = RHS$$

∴ LHS = RHS

Question 7:

$(\tan\theta+\sin\theta)=m$ and $(\tan\theta-\sin\theta)=n$

$$LHS=\left(m^2-n^2\right)^2$$

$$=\left[(\tan\theta+\sin\theta)^2-(\tan\theta-\sin\theta)^2\right]^2$$

$$=\left[4\tan\theta\sin\theta\right]^2 \quad \left[\because (a+b)^2-(a-b)^2=4ab\right]$$

$$=16\tan^2\theta\sin^2\theta \quad -----(1)$$

$$RHS=16mn=16(\tan\theta+\sin\theta)(\tan\theta-\sin\theta)$$

$$=16\left(\tan^2\theta-\sin^2\theta\right)=16\left(\frac{\sin^2\theta}{\cos^2\theta}-\sin^2\theta\right)$$

$$=16\left(\frac{\sin^2\theta-\sin^2\theta\cos^2\theta}{\cos^2\theta}\right)$$

$$=16\frac{\sin^2\theta\left(1-\cos^2\theta\right)}{\cos^2\theta} \quad \left[\because 1-\cos^2\theta=\sin^2\theta\right]$$

$$=16\frac{\sin^2\theta}{\cos^2\theta}\times\sin^2\theta$$

$$RHS=16\tan^2\sin^2\theta \quad ------(2)$$

$\therefore$ LHS = RHS

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