Exercise 7A

Question 22

(i) $\text{LHS} = \dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} + \dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta}$

$= \dfrac{(\sin\theta - \cos\theta)^2 + (\sin\theta + \cos\theta)^2}{(\sin\theta + \cos\theta)(\sin\theta - \cos\theta)}$

$= \dfrac{\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta + \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta}{\sin^2\theta - \cos^2\theta}$

$= \dfrac{1+1}{\sin^2\theta - (1 - \sin^2\theta)} = \dfrac{2}{(2\sin^2\theta - 1)} = \text{RHS}$

$\therefore$ LHS = RHS

(ii) $\dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta}$

$\text{LHS} = \dfrac{(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2}{\sin^2\theta - \cos^2\theta}$

$= \dfrac{\sin^2\theta + \cos^2\theta + 2\cos\theta\sin\theta + \sin^2\theta + \cos^2\theta - 2\cos\theta\sin\theta}{1 - \cos^2\theta - \cos^2\theta}$

$= \dfrac{1+1}{1 - 2\cos^2\theta} = \dfrac{2}{(1 - 2\cos^2\theta)} = \text{RHS}$

$\therefore$ LHS = RHS

Question 23

$\text{LHS} = \dfrac{\cos^3\theta + \sin^3\theta}{\cos\theta + \sin\theta} + \dfrac{\cos^3\theta - \sin^3\theta}{\cos\theta - \sin\theta}$

$= \dfrac{(\cos\theta + \sin\theta)(\cos^2\theta - \cos\theta\sin\theta + \sin^2\theta)}{\cos\theta + \sin\theta}$

$+ \dfrac{(\cos\theta - \sin\theta)(\cos^2\theta + \cos\theta\sin\theta + \sin^2\theta)}{\cos\theta - \sin\theta}$

$= \cos^2\theta - \cos\theta \times \sin\theta + \sin^2\theta + \cos^2\theta + \cos\theta\sin\theta + \sin^2\theta$

$= 2\left[\cos^2\theta + \sin^2\theta\right] = 2$

$\therefore$ LHS = RHS

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