

Exercise 7A

Question 30

$$\begin{split} \mathsf{LHS} &= \frac{\cos\theta \cos \mathsf{e} \, \mathsf{c} \theta - \sin\theta \, \mathsf{s} \mathsf{e} \, \mathsf{c} \theta}{\cos\theta + \sin\theta} \\ &= \frac{\cos\theta \times \frac{1}{\sin\theta} - \sin\theta \times \frac{1}{\cos\theta}}{\cos\theta + \sin\theta} = \frac{\frac{\cos\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta}}{(\cos\theta + \sin\theta)} \\ &= \frac{\cos^2\theta - \sin^2\theta}{\sin\theta \cos\theta (\cos\theta + \sin\theta)} \\ &= \frac{(\cos\theta + \sin\theta)(\cos\theta - \sin\theta)}{\sin\theta \cos\theta (\cos\theta + \sin\theta)} \\ &= \frac{\cos\theta}{\sin\theta \cos\theta} - \frac{\sin\theta}{\sin\theta \cos\theta} \\ &= \cos\theta\theta - \sec\theta = \mathsf{RHS} \end{split}$$

: LHS = RHS

Question 31

$$\begin{split} \mathsf{LHS} &= \big(1 + \tan\theta + \cot\theta\big) \big(\sin\theta - \cos\theta\big) \\ &= \bigg(1 + \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}\bigg) \big(\sin\theta - \cos\theta\big) \\ &= \bigg(\frac{\cos\theta\sin\theta + \sin^2\theta + \cos^2\theta}{\cos\theta\sin\theta}\bigg) \big(\sin\theta - \cos\theta\big) \\ &= \frac{\big(\cos\theta\sin\theta + 1\big)}{\cos\theta\sin\theta} \big(\sin\theta - \cos\theta\big) \\ \mathsf{RHS} &= \bigg(\frac{\sec\theta}{\cos^2\theta} - \frac{\cos^2\theta}{\sec^2\theta}\bigg) = \bigg(\frac{\frac{1}{\cos\theta}}{\frac{1}{\sin^2\theta}} - \frac{\frac{1}{\sin\theta}}{\frac{1}{\cos^2\theta}}\bigg) \\ &= \bigg(\frac{\sin^2\theta}{\cos\theta} - \frac{\cos^2\theta}{\sin\theta}\bigg) = \frac{\sin^3\theta - \cos^3\theta}{\cos\theta\sin\theta} \\ &= \frac{\big(\sin\theta - \cos\theta\big) \Big(\sin^2\theta + \cos^2\theta + \cos\theta\sin\theta\big)}{\cos\theta\sin\theta} \\ &= \frac{\big(\sin\theta - \cos\theta\big) \Big(1 + \cos\theta\sin\theta\big)}{\cos\theta\sin\theta} \\ &= \frac{\big(\sin\theta - \cos\theta\big) \Big(1 + \cos\theta\sin\theta\big)}{\cos\theta\sin\theta} \end{split}$$

:: LHS = RHS

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