

## Written homework 2

$$67. \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} + 1 = 2 \cos^2 \theta$$

$$\begin{aligned} \text{LHS} &= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} + 1 \\ &= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} + \frac{1 + \tan^2 \theta}{1 + \tan^2 \theta} \\ &= \frac{2}{1 + \tan^2 \theta} \\ &= \frac{2}{\sec^2 \theta} \\ &= 2 \cos^2 \theta = \text{RHS} \end{aligned}$$

$$\begin{aligned} \frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta} &= \frac{1}{\cos^2 \theta} \\ \tan^2 \theta + 1 &= \sec^2 \theta \end{aligned}$$

$$69. \frac{\sec \theta - \csc \theta}{\sec \theta \csc \theta} = \sin \theta - \cos \theta$$

$$\begin{aligned} \text{LHS} &= \frac{\sec \theta - \csc \theta}{\sec \theta \csc \theta} \\ &= \frac{\frac{1}{\cos \theta} - \frac{1}{\sin \theta}}{\frac{1}{\sin \theta \cos \theta}} \\ &= \frac{\frac{\sin \theta - \cos \theta}{\sin \theta \cos \theta}}{\frac{1}{\sin \theta \cos \theta}} \\ &= \sin \theta - \cos \theta = \text{RHS} \end{aligned}$$

$$71. \sec \theta - \cos \theta = \sin \theta \tan \theta$$

$$\text{LHS} = \sec \theta - \cos \theta$$

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

$$= \frac{1}{\cos \theta} - \frac{\cos^2 \theta}{\cos \theta}$$

$$= \frac{1 - \cos^2 \theta}{\cos \theta}$$

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

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

$$= \sin \theta \cdot \tan \theta = \text{RHS}$$

$$73. \frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} = 2 \sec^2 \theta$$

$$\text{LHS} = \frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta}$$

$$= \frac{(1 + \sin \theta) + (1 - \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)}$$

$$= \frac{2}{1 - \sin^2 \theta}$$

$$= \frac{2}{\cos^2 \theta}$$

$$= 2 \sec^2 \theta = \text{RHS}$$

$$79. \frac{\sin\theta + \cos\theta}{\cos\theta} - \frac{\sin\theta - \cos\theta}{\sin\theta} = \sec\theta \csc\theta$$

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

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

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

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

$$= \sec\theta \csc\theta = \text{RHS}$$

$$83. \frac{\cos^2\theta - \sin^2\theta}{1 - \tan^2\theta} = \cos^2\theta$$

$$\text{LHS} = \frac{\cos^2\theta - \sin^2\theta}{1 - \tan^2\theta}$$

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

$$= \frac{\cos^2\theta - \sin^2\theta}{\frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta}}$$

$$= \cos^2\theta = \text{RHS.}$$