$$\frac{\sec\theta}{\csc\theta} + \frac{\sin\theta}{\cos\theta} = 2\tan\theta$$

$$\frac{\sec\theta}{\csc\theta} + \frac{\sin\theta}{\cos\theta} = \frac{\frac{1}{\cos\theta}}{\frac{1}{\sin\theta}} + \tan\theta$$

$$= \frac{1}{\cos\theta} \cdot \frac{\sin\theta}{1} + \tan\theta$$

$$= \frac{\sin\theta}{\cos\theta} + \tan\theta$$

$$= \tan\theta + \tan\theta$$

$$= 2\tan\theta$$

Establish identity

$$3\sin^2\theta + 4\cos^2\theta = 3 + \cos^2\theta$$

$$3\sin^2\theta + 4\cos^2\theta = 3(1-\cos^2\theta) + 4\cos^2\theta$$

$$= 3 - 3\cos^2\theta + 4\cos^2\theta$$

$$= 3 + \cos^2\theta$$

$$-3x + 4x = x$$

$$\sec\theta - \cos\theta - \sin\theta\tan\theta = 0$$

$$\sec\theta - \cos\theta - \sin\theta\tan\theta = \frac{1}{\cos\theta} - \frac{\cos\theta}{1} - \frac{\sin\theta}{1} \cdot \frac{\sin\theta}{\cos\theta}$$

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

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

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

$= \cos\theta - \cos\theta$

$= 0$

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

$A^2 - B^2 = (A-B)(A+B)$

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

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

$$= 1 - 1 + \sin\theta$$

$$= \sin\theta$$

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

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

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

$$= 1 - 1 - \cos\theta$$

$$= -\cos\theta$$

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

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

$$\text{LCD}=\sin\theta\cos\theta \qquad -\frac{\sin\theta}{\sin\theta}\frac{(\cos\theta-\sin\theta)}{\cos\theta}$$

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

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

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

$$=\sec\theta\cdot\csc\theta$$

$$(2a\sin\theta\cos\theta)^2+a^2(\cos^2\theta-\sin^2\theta)^2=a^2$$

$$(2a\sin\theta\cos\theta)^2+a^2(\cos^2\theta-\sin^2\theta)^2$$

$$=4a^2\sin^2\theta\cos^2\theta+a^2(\cos^4\theta-2\sin^2\theta\cos^2\theta+\sin^4\theta)$$

$$=a^2\left[4\sin^2\theta\cos^2\theta+\cos^4\theta-2\sin^2\theta\cos^2\theta+\sin^4\theta\right]$$

$$= a^2\left[\cos^4\theta + 2\sin^2\theta\cos^2\theta + \sin^4\theta\right]$$

$$= a^2\left(\cos^2\theta + \sin^2\theta\right)^2$$

$$= a^2 \cdot 1^2$$

$$= a^2$$

$$\frac{X - Y}{Z} = \frac{X}{Z} - \frac{Y}{Z}$$

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

$$\frac{\sec\theta - \csc\theta}{\sec\theta\csc\theta} = \frac{\cancel{\sec\theta}^{1}}{\cancel{\sec\theta}\csc\theta} - \frac{\cancel{\csc}^{1}\theta}{\sec\theta\cancel{\csc\theta}}$$

$$= \frac{1}{\csc\theta} - \frac{1}{\sec\theta}$$

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

$$= \sin\theta - \cos\theta$$