

$$\textcircled{1} (\sec^2 \theta - 1) \cos^2 \theta = \sin^2 \theta$$

$$\tan^2 \theta \cos^2 \theta$$

$$\frac{\sin^2 \theta \cdot \cos^2 \theta}{\cos^2 \theta \cdot 1}$$

$$\sin^2 \theta = \sin^2 \theta \checkmark$$

$$\textcircled{2} \sec^2 \theta (1 - \cos^2 \theta) = \tan^2 \theta$$

$$(\tan^2 \theta + 1)(\sin^2 \theta)$$

$$\left(\frac{\sin^2 \theta}{\cos^2 \theta} + \frac{\cos^2 \theta}{\cos^2 \theta} \right) (\sin^2 \theta)$$

$$\left(\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta} \right) (\sin^2 \theta)$$

$$\left(\frac{1}{\cos^2 \theta} \right) \left(\frac{\sin^2 \theta}{1} \right)$$

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

$$\textcircled{3} \sin \theta - \sin \theta \cos^2 \theta = \sin^3 \theta$$

$$\sin \theta (1 - \cos^2 \theta)$$

$$(\sin \theta)(\sin^2 \theta)$$

$$\sin^3 \theta = \sin^3 \theta \checkmark$$

$$(4) \csc \theta - \cos \theta \cot \theta = \sin \theta$$

$$\frac{1}{\sin \theta} - \cos \theta \left(\frac{\cos \theta}{\sin \theta} \right) =$$

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

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

$$\frac{\sin^2 \theta}{\sin \theta} \quad \sin \theta = \sin \theta \checkmark$$

$$(5) \cot^2 \theta \csc^2 \theta - \cot^2 \theta = \cot^4 \theta$$

$$\cot^2 \theta (\csc^2 \theta - 1)$$

$$\cot^2 \theta (\cot^2 \theta)$$

$$\cot^4 \theta = \cot^4 \theta$$

$$(6) \tan \theta \csc^2 \theta - \tan \theta = \cot \theta$$

$$\tan \theta (\csc^2 \theta - 1) = \cot \theta$$

$$\tan \theta (\cot^2 \theta) = \cot \theta$$

$$\left(\frac{\sin \theta}{\cos \theta} \right) \left(\frac{\cos^2 \theta}{\sin^2 \theta} \right) = \frac{\cos \theta}{\sin \theta} = \cot \theta = \cot \theta \checkmark$$

$$(7) \frac{\sec \theta}{\sin \theta} - \frac{\sin \theta}{\cos \theta} = \cot \theta$$

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

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

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

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

$$(14) \cos^4 \theta - \sin^4 \theta = \cos^2 \theta - \sin^2 \theta$$

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

$$(\cos^2 \theta - \sin^2 \theta)(1) = \cos^2 \theta - \sin^2 \theta = \cos^2 \theta - \sin^2 \theta \checkmark$$

$$(20) (\csc \theta + \cot \theta)(1 - \cos \theta) = \sin \theta$$

$$\left(\frac{1}{\sin \theta} + \frac{\cos \theta}{\sin \theta} \right) (1 - \cos \theta)$$

$$\left(\frac{1 + \cos \theta}{\sin \theta} \right) \left(\frac{1 - \cos \theta}{1} \right)$$

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

$$(26) \tan^2 \theta \cos^2 \theta = 1 - \cos^2 \theta$$

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

$$\sin^2 \theta = 1 - \cos^2 \theta = 1 - \cos^2 \theta \checkmark$$

Example: with conjugate

$$\frac{\sin \theta}{1 - \cos \theta} = \csc \theta + \cot \theta$$

$$\frac{\sin \theta}{1 - \cos \theta} \cdot \frac{1 + \cos \theta}{1 + \cos \theta}$$

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

$$\frac{\cancel{\sin \theta} (1 + \cos \theta)}{\sin^2 \theta}$$

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

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