

## 5.2 Puzzle Practice

$$\textcircled{1} \frac{\sin x - 1}{\sin x + 1} = \frac{-\cos^2 x}{(\sin x + 1)^2}$$

$$\frac{\sin x - 1}{\sin x + 1} \cdot \frac{\sin x + 1}{\sin x + 1} =$$

$$\frac{\sin^2 x - 1}{(\sin x + 1)^2} =$$

$$\frac{-\cos^2 x}{(\sin x + 1)^2} \quad \checkmark$$

$$\textcircled{2} \frac{\sin w}{\sin w + \cos w} = \frac{\tan w}{1 + \tan w}$$

$$= \frac{\frac{\sin w}{\cos w}}{1 + \frac{\sin w}{\cos w}}$$

$$= \frac{\sin w}{\cos w} \cdot \frac{\cos w}{\cos w + \sin w}$$

$$= \frac{\sin w}{\cancel{\cos w}} \cdot \frac{\cancel{\cos w}}{\cos w + \sin w}$$

$$= \frac{\sin w}{\cos w + \sin w} \quad \checkmark$$

$$(3) \quad \sec t \csc t (\tan t + \cot t) = \sec^2 t + \csc^2 t$$

$$\sec t \csc t \tan t + \sec t \csc t \cot t =$$

$$\frac{1}{\cos t} \cdot \frac{1}{\sin t} \cdot \frac{\sin t}{\cos t} + \frac{1}{\cos t} \cdot \frac{1}{\sin t} \cdot \frac{\cos t}{\sin t} =$$

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

$$\sec^2 t + \csc^2 t \quad \checkmark$$

$$(4) \quad \sec v - \tan v = \frac{1}{\sec v + \tan v}$$

$$= \frac{1}{\sec v + \tan v}$$

$$= \frac{1}{\sec v + \tan v} \cdot \frac{\sec v - \tan v}{\sec v - \tan v}$$

$$= \frac{\sec v - \tan v}{\sec^2 v - \tan^2 v}$$

$$= \frac{\sec v - \tan v}{1}$$

$$= \sec v - \tan v \quad \checkmark$$

$$\textcircled{5} \quad \frac{\sin A}{1 - \cos A} - \cot A = \csc A$$

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

$$\frac{\sin^2 A - \cos A(1 - \cos A)}{(1 - \cos A)\sin A} =$$

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

$$\frac{1 - \cos A}{(1 - \cos A)\sin A} =$$

$$\frac{1}{\sin A} =$$

$$\csc A \quad \checkmark$$

$$\textcircled{6} \quad \tan^2 x - \sin^2 x = \tan^2 x \sin^2 x$$

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

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

$$\frac{\sin^2 x(1 - \cos^2 x)}{\cos^2 x} =$$

$$\frac{\sin^2 x (\sin^2 x)}{\cos^2 x} =$$

$$\tan^2 x \sin^2 x \quad \checkmark$$

