

$$\begin{aligned} & [2][a] \frac{\sec A \tan A}{\cot^2 A - \tan^2 A - \csc^2 A} \\ &= \frac{-\sec A \tan A}{\csc^2 A - \cot^2 A + \tan^2 A} \\ &= \frac{-\sec A \tan A}{1 + \tan^2 A} \\ &= \frac{-\sec A \tan A}{\sec^2 A} \\ &= -\frac{\tan A}{\sec A} \\ &= -\tan A \cos A \\ &= -\frac{\sin A}{\cos A} \cos A \\ &= -\sin A \end{aligned}$$

$$[6] \frac{\sec x \tan x + \sec x \cot x}{\csc x}$$

$$= \frac{\sec x}{\csc x} (\tan x + \cot x)$$

$$= \frac{\sin x}{\cos x} (\tan x + \cot x)$$

$$= \tan x (\tan x + \cot x)$$

$$= \tan^2 x + 1$$

$$= \sec^2 x$$

$$[3][a] \frac{\cos(-\theta)}{\tan\theta - \cot(-\theta)} + \sin^3\theta$$

$$= \frac{\cos\theta}{\tan\theta + \cot\theta} + \sin^3\theta$$

$$= \frac{\cos\theta}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}} + \sin^3\theta$$

$$= \frac{\cos^2\theta \sin\theta}{\sin^2\theta + \cos^2\theta} + \sin^3\theta$$

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

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

$$= \sin\theta$$

$$[b] \frac{1 + \sin^2 D}{\csc^2 D - \sin^2 D}$$

$$= \frac{1 + \sin^2 D}{\frac{1}{\sin^2 D} - \sin^2 D} \cdot \frac{\sin^2 D}{\sin^2 D}$$

$$= \frac{(1 + \sin^2 D) \sin^2 D}{1 - \sin^4 D}$$

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

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

$$= \tan^2 D$$

$$\begin{aligned}
[c] & (\sec t - \sin(\frac{\pi}{2} - t))(\sec(\frac{\pi}{2} - t) - \sin t) \\
&= (\sec t - \cos t)(\csc t - \sin t) \\
&= \left(\frac{1}{\cos t} - \cos t\right)\left(\frac{1}{\sin t} - \sin t\right) \\
&= \frac{1 - \cos^2 t}{\cos t} \frac{1 - \sin^2 t}{\sin t} \\
&= \frac{\sin^2 t}{\cos t} \frac{\cos^2 t}{\sin t} \\
&= \sin t \cos t
\end{aligned}$$

$$\begin{aligned}
& \tan t - \tan t \sin^2 t \\
&= \tan t (1 - \sin^2 t) \\
&= \frac{\sin t}{\cos t} \cos^2 t \\
&= \sin t \cos t
\end{aligned}$$