[2][a]

$$\frac{\sec A \tan A}{\cot^2 A - \tan^2 A - \csc^2 A}$$

$$= \frac{-\sec A \tan A}{\csc^2 A - \cot^2 A + \tan^2 A}$$

$$= \frac{-\sec A \tan A}{1 + \tan^2 A}$$

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

$$= -\frac{\tan A}{\sec A}$$

$$= -\tan A \cos A$$

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

$$= -\sin A$$

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

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

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

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

$= \tan^2 x + 1$

$= \sec^2 x$

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

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

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

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

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

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

$= \sin\theta$

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

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

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

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

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

$= \tan^2 D$

[c] $(\sec t - \sin(\frac{\pi}{2}-t))(\sec(\frac{\pi}{2}-t) - \sin t)$

$= (\sec t - \cos t)(\csc t - \sin t)$

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

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

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

$= \sin t \cos t$

$\tan t - \tan t \sin^2 t$

$= \tan t (1 - \sin^2 t)$

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

$= \sin t \cos t$