$$\frac{1+\sin x}{\cos x}+\frac{\cos x}{1+\sin x}=2\sec x$$

$$\hookrightarrow = \frac{(1+\sin x)^2+\cos^2 x}{\cos x\,(1+\sin x)}$$

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

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

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

$$= 2\sec x$$

$(\sec y - \cos y)^2 = \tan^2 y - \sin^2 y$

$= \sec^2 y - 2\sec y \cos y + \cos^2 y$

$= \tan^2 y + 1 - 2 + 1 - \sin^2 y$

$= \tan^2 y - \sin^2 y$

$\cos t \cot(-t) + \sin(-t) - \csc(-t) + \cos(-t) - \sec(-t) = \sin t \tan(-t)$.

$\hookrightarrow = -\cos t \cot t - \sin t + \csc t + \cos t - \sec t$

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

$= \frac{-\cos^2 t - \sin^2 t + 1}{\sin t} + \frac{\cos^2 t - 1}{\cos t}$ ($-\cos^2 t - \sin^2 t + 1 = 0$)

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

$= \sin t \cdot \frac{-\sin t}{\cos t}$

$= \sin t \cdot -\tan t$

$= \sin t \tan(-t)$

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

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

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

$$= -\cot\theta$$

$$\frac{\cos^2\beta}{1-\csc^2\beta}$$

$$= \frac{\cos^2\beta}{-\cot^2\beta}$$

$$= -\cos^2\beta \tan^2\beta$$

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

$$= -\sin^2\beta$$