

$$b) \sec t - \frac{\cos t}{1 + \sin t} = \tan t$$

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

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

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

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

$$\frac{\sin t(\sin t + 1)}{(1 + \sin t)(\cos t)} = \tan t$$

$$\frac{\sin t}{\cos t} = \tan t$$

$$\tan t = \tan t$$

$$c) \frac{\sec^2 x \cot x}{\csc^2 x} = \tan x$$

$$\frac{\csc x \cdot \frac{1}{\cos^2 x} \cdot \frac{\cos x}{\sin x}}{\frac{1}{\sin^2 x}} = \tan x$$

$$\frac{1}{\cos x \cdot \sin x} \cdot \frac{\sin^2 x}{1} = \tan x$$

$$\frac{\sin x}{\cos x} = \tan x$$

$$\tan x = \tan x$$

$$d) \frac{\tan x}{\sec x - 1} + \frac{\tan x}{\sec x + 1} = 2 \csc x$$

$$\left(\frac{\tan x}{\sec x - 1} + \frac{\tan x}{\sec x + 1} \right) = 2 \csc x$$

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

$$\frac{2 \tan x \cdot \sec x}{\tan^2 x} = 2 \csc x$$

$$\frac{2 \sec x}{\tan x} = 2 \csc x$$

$$\frac{2 \cdot \frac{1}{\cos x}}{\frac{\sin x}{\cos x}} = 2 \csc x$$

$$\frac{2}{\sec x} \cdot \frac{\cos x}{\sin x} = 2 \csc x$$

$$2 \cdot \frac{1}{\sin x} = 2 \csc x$$

$$2 \csc x = 2 \csc x$$

$$\text{e) } \sec^4 \theta - 1 = 2 \tan^2 \theta + \tan^4 \theta$$

$$\begin{aligned} (\sec^2 \theta + 1)(\sec^2 \theta - 1) &= 2 \tan^2 \theta + \tan^4 \theta \\ (1 + \tan^2 \theta + 1)(\tan^2 \theta) &= 2 \tan^2 \theta + \tan^4 \theta \\ (2 + \tan^2 \theta)(\tan^2 \theta) &= 2 \tan^2 \theta + \tan^4 \theta \\ 2 \tan^2 \theta + \tan^4 \theta &= 2 \tan^2 \theta + \tan^4 \theta \end{aligned}$$

$$f) \frac{\sin^2 \varphi \sec^2 \varphi + \cos^2 \varphi (\tan^2 \varphi + 1) - 1}{\sec^2 \varphi} = \sin^2 \varphi$$

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

$$\textcircled{\sin^2 \varphi + \cos^2 \varphi} - \frac{1}{\sec^2 \varphi} = \sin^2 \varphi$$

$$1 - \cos^2 \varphi = \sin^2 \varphi$$

$$\sin^2 \varphi = \sin^2 \varphi$$