

$$31. \quad \frac{\tan x}{\csc^2 x} + \frac{\tan x}{\sec^2 x}$$

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

KCF

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

KCF

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

Factor out $\sin x$

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

← common D → 1

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

32.

$$\frac{\sec^2 x \csc x}{\sec^2 x + \csc^2 x}$$

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

$$\frac{\frac{1}{\sin^2 x \cos^2 x}}{\frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x}}$$

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

KCF

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

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