

$$5. f(x) = \frac{\sin^2 x + \cos^2 x}{\csc x}$$

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

$$= \sin x \quad \boxed{\text{Yes}}$$

$$6. f(x) = \frac{\tan x}{\sec x}$$

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

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

$$= \sin x \quad \boxed{\text{Yes}}$$

$$7. f(x) = \cos x \cdot \cot x$$

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

$$= \frac{\cos^2 x}{\sin x} \quad \boxed{\text{No}}$$

$$9. f(x) = (\sin^3 x)(1 + \cot^2 x)$$

$$= (\sin^3 x)(\csc^2 x)$$

$$= \sin^3 x \left( \frac{1}{\sin^2 x} \right)$$

$$= \sin x \quad \boxed{\text{Yes}}$$

$$10. f(x) = \frac{\sin^2 x}{2} = \frac{1}{2} \sin^2 x \quad \boxed{\text{No}}$$

$$11. (\cos x)(\tan x + \sin x \cot x) = \sin x + \cos^2 x$$

$$\begin{aligned} \hookrightarrow \cancel{\cos x} \left( \frac{\sin x}{\cancel{\cos x}} \right) + \cos x \left( \sin x \cdot \frac{\cos x}{\sin x} \right) &= \\ = \sin x + \cos^2 x &\checkmark \end{aligned}$$

$$12. (\sin x)(\cot x + \cos x \tan x) = \cos x + \sin^2 x$$

$$\begin{aligned} \hookrightarrow \cancel{\sin x} \left( \frac{\cos x}{\cancel{\sin x}} \right) + \sin x \left( \cos x \cdot \frac{\sin x}{\cancel{\sin x}} \right) &= \\ = \cos x + \sin^2 x &\checkmark \end{aligned}$$

$$13. (1 - \tan x)^2 = \sec^2 x - 2 \tan x$$

$$\begin{aligned} \hookrightarrow \mathbb{R} (1 - \tan x)(1 - \tan x) &= \\ 1 - 2 \tan x + \tan^2 x &= \\ \underbrace{1 + \tan^2 x} - 2 \tan x &= \\ = \sec^2 x - 2 \tan x &\checkmark \end{aligned}$$

$$14. (\cos x - \sin x)^2 = 1 - 2 \cos x \sin x$$

$$\begin{aligned} \hookrightarrow \mathbb{R} (\cos x - \sin x)(\cos x - \sin x) &= \\ \cos^2 x - \underbrace{2 \cos x \sin x} + \sin^2 x &= \\ = 1 - 2 \cos x \sin x &\checkmark \end{aligned}$$