

Simplify each expression to a single trig function or number.

1.  $\cos \theta \tan \theta$

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

2.  $\cot x \sec x$

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

3.  $\sec x \cos x$

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

4.  $\frac{\cot \theta}{\tan \theta}$

$$= \frac{\cos \theta}{\sin \theta} \div \frac{\sin \theta}{\cos \theta}$$
$$= \frac{\cos \theta}{\sin \theta} \cdot \frac{\cos \theta}{\sin \theta}$$
$$= \frac{\cos^2 \theta}{\sin^2 \theta} = \boxed{\cot^2 \theta}$$

5.  $\cos \theta (\sec \theta - \cos \theta)$

$$= \cos \theta \sec \theta - \cos^2 \theta$$
$$= \frac{\cos \theta}{1} \cdot \frac{1}{\cos \theta} - \cos^2 \theta$$
$$= 1 - \cos^2 \theta$$
$$= \boxed{\sin^2 \theta}$$

6.  $1 - \cos^2 \theta$

$$= \boxed{\sin^2 \theta}$$

7.  $\frac{1 - \cos^2 \theta}{\sin \theta}$

$$= \frac{\sin^2 \theta}{\sin \theta}$$
$$= \frac{\sin \theta \sin \theta}{\sin \theta}$$
$$= \boxed{\sin \theta}$$

8.  $\frac{\sin x \cos x}{1 - \cos^2 x}$

$$= \frac{\sin x \cdot \cos x}{\sin^2 x}$$
$$= \frac{\cancel{\sin x} \cos x}{\cancel{\sin x} \sin x}$$
$$= \frac{\cos x}{\sin x}$$
$$= \boxed{\cot x}$$

$$\begin{aligned}
 9. \frac{\sin^2 x \cot x}{\cos x} &= \frac{\frac{\sin^2 x}{1} \cdot \frac{\cos x}{\sin x}}{\cos x} \\
 &= \frac{\cancel{\sin x} \cos x}{\cancel{\cos x}} \\
 &= \boxed{\sin x}
 \end{aligned}$$

$$\begin{aligned}
 10. (\sec x - 1)(\sec x + 1) \\
 &= \sec^2 x + \cancel{\sec x} - \cancel{\sec x} - 1 \\
 &= \sec^2 x - 1 \\
 &= \boxed{\tan^2 x}
 \end{aligned}$$

$$\begin{aligned}
 11. \frac{\cos\left[\left(\frac{\pi}{2}\right) - x\right]}{\sin\left[\left(\frac{\pi}{2}\right) - x\right]} &= \frac{\sin x}{\cos x} \\
 &= \boxed{\tan x}
 \end{aligned}$$

$$\begin{aligned}
 12. \frac{\csc^2 x - 1}{\cos^2 x} &= \frac{\cot^2 x}{\cos^2 x} \\
 &= \frac{\cos^2 x}{\sin^2 x} \div \frac{\cos^2 x}{1} \\
 &= \frac{\cancel{\cos^2 x}}{\sin^2 x} \cdot \frac{1}{\cancel{\cos^2 x}} \\
 &= \frac{1}{\sin^2 x} = \boxed{\csc^2 x}
 \end{aligned}$$

$$13. \frac{\sin(-x)}{\cos(-x)} = \frac{-\sin x}{\cos x} = \boxed{-\tan x}$$

**Answer Key:**

- 1)  $\sin \theta$  2)  $\csc x$  3) 1 4)  $\cot^2 \theta$  5)  $\sin^2 \theta$  6)  $\sin^2 \theta$  7)  $\sin \theta$  8)  $\cot x$   
 9)  $\sin x$  10)  $\tan^2 x$  11)  $\tan x$  12)  $\csc^2 x$  13)  $-\tan x$