

$$1) \sin x \sec x = \tan x$$

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

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

$$2) \sec x \tan x \csc x = \sec^2 x$$

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

$$\frac{1}{\cos^2 x} = \sec^2 x$$

$$3) \sin^2 x \cot x \csc x = \cos x$$

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

$$\cos x = \cos x$$

$$4) \cos^2 x \tan x \sec x = \sin x$$

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

$$\sin x = \sin x$$

$$5) \frac{\cot^2 x + 1}{\csc x} = \csc x$$

$$\frac{\csc^2 x - \csc x}{\csc x} = \csc x$$

$$\csc x = \csc x$$

$$6) \sin x \csc x - \cos^2 x = \sin^2 x$$

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

$$\sin^2 x = \sin^2 x$$

$$7) \frac{\sec x}{\csc x} = \tan x$$

$$\frac{1}{\cos x} \div \frac{1}{\sin x} \rightarrow \frac{1}{\cos x} \cdot \frac{\sin x}{1} = \frac{\sin x}{\cos x} = \tan x$$

$$8) \cos^2 x (1 + \tan^2 x) = 1$$

$$\cos^2 x (\sec^2 x) = 1$$

$$1 = 1$$

$$9) \sin x (1 + \cot^2 x) = \frac{1}{\sin x}$$

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

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

$$10) \sec^2 x \csc^2 x - \sec^2 x = \csc^2 x$$

$$\sec^2 x (\csc^2 x - 1) = \csc^2 x$$

$$\frac{1}{\cos^2 x} (\cot^2 x)$$

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

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

$$11) \frac{\cos \sec x}{\tan x} = \cot x$$

$$\frac{1}{\tan x} = \cot x$$

$$12) \frac{\overset{\sin x}{\sin x} + \overset{\cos x}{\cos x}}{\sin x \cos x} = \frac{1}{\cos x \sin x}$$

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

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

$$13. (\tan x + \cot x) \sin x \cos x = 1$$

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

$$\sin^2 x + \cos^2 x = 1$$

$$1 = 1$$

$$14. (\sec x - \tan x)(1 + \sin x) = 1$$

$\sec x - \tan x$	
$\sec x$	$-\tan x$
$\sec x \sin x$	$-\tan x \sin x$

$$\sec x - \tan x + \sec x \sin x - \tan x \sin x$$

$$\frac{1}{\cos x} - \frac{\sin x}{\cos x} + \frac{1}{\cos x} (\sin x) - \frac{\sin x \cdot \sin x}{\cos x}$$

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

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

$$\frac{\cos^2 x}{\cos x}$$

$$\cos x$$

$$15) 1 + \tan^2 x + \sec^2 x \cot^2 x = \tan^2 x$$

$$\csc^2 x + \cos^2 x \csc^2 x$$

$$\sec^2 x + \sec^2 x \cot^2 x$$

$$\csc^2 x + \cos^2 x \csc^2 x$$

$$\sec^2 x (1 + \cot^2 x)$$

$$\csc^2 x (1 + \cos^2 x)$$

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

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

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

$$16) \frac{\sec^2 x}{\sec x} = \sec x$$

$$17) \sec^2 x - 1 = \tan^2 x$$
$$\tan^2 x = \tan^2 x$$

$$18) \sin^2 x = 1 - \cos^2 x$$
$$\sin^2 x = \sin^2 x$$

$$19) \sec x - \tan x = \frac{1}{\cos x} - \frac{\sin x}{\cos x}$$

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

$$20) \frac{\sin x}{1} + \frac{\cos x \cdot \cos x}{1 \cdot \sin x} = \csc x$$

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

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

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

$$21) \cot x \cos x + \tan x + \cot x \sin x = 2 \cos x$$

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

$$\cos x + \cos x = 2 \cos x$$

$$2 \cos x = 2 \cos x$$

$$22) \sin x \div \frac{1}{\sin x} + \cos x \div \frac{1}{\cos x} = 1$$

$$\begin{aligned} \sin x \cdot \sin x + \cos x \cdot \cos x &= 1 \\ \sin^2 x + \cos^2 x &= 1 \\ 1 &= 1 \end{aligned}$$

$$23) \tan^2 x + 1 = \sec^2 x$$

$$24) \frac{1}{\tan x} + \tan x = \sec x \csc x$$

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

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

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

$$25) -3 \sec^2 x + 4 = 0$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\frac{-3 \sec^2 x = -4}{-3}$$

$$\sqrt{\sec^2 x} = \sqrt{\frac{4}{3}}$$

$$\sec x = \pm \frac{2}{\sqrt{3}} = \pm \frac{2\sqrt{3}}{3}$$

$$60, 150, 210, 330$$

$$26) \cos^3 x - \cos x = 0$$

$$\cos x (\cos^2 x - 1) = 0$$

$$\cos x = 0$$

$$x = 90, 270$$

$$\cos x = \pm 1$$

$$x = 0, 360, 180$$

$$27. \cos^2 x - \frac{1}{2} \cos x = 0$$

$$\cos x (\cos x - \frac{1}{2}) = 0$$

$$\cos x = 0 \quad \cos x = \frac{1}{2}$$

$$x = 90, 270$$

$$x = 60, 300$$

$$28) 10 \cos x = 5$$

$$\cos x = \frac{5}{10} = \frac{1}{2}$$

$$\cos x = \frac{1}{2}$$

$$60, 300$$

$$29). \sec^2 x - 2 = 0$$

$$\sqrt{\sec^2} = \sqrt{2}$$

$$\sec x = \pm \sqrt{2}$$

$$45, 135, 225, 315$$

$$30) \quad 2 \cos^2 x - 3 \cos x + 1 = 0$$

$$\left(\cos x - \frac{2}{2} \right) \left(\cos x - \frac{1}{2} \right) = 0$$

$$\cos x = 1$$

$$0, 360$$

$$\cos x = \frac{1}{2}$$

$$60, 300$$

$$31) \quad \tan x (\sqrt{3} \sec x + 2) = 0$$

$$\tan x = 0$$

$$0, 180, 360$$

$$\sec x = \frac{-2}{\sqrt{3}}$$

$$\sec x = -\frac{2\sqrt{3}}{3}$$

$$150, 210$$

$$32) \quad \cos^2 x - (1 - \cos^2 x) + 3 \cos x - 1 = 0$$

$$\cos^2 x - 1 + \cos^2 x + 3 \cos x - 1 = 0$$

$$2 \cos^2 x + 3 \cos x - 2 = 0$$

$$\left(\cos x - \frac{1}{2} \right) \left(\cos x + 4 \right) = 0$$

$$\cos x = \frac{1}{2}$$

$$60, 300$$

$$\cos x = -2$$

NS.

$$33) \quad 2 \sin x \cos x - 2 \sin x = 0$$

$$2 \sin x (\cos x - 1) = 0$$

$$2 \sin x = 0$$

$$\sin x = 0$$

$$x = 0, 180, 360$$

$$\cos x = 1$$

$$\cos x = 1$$

$$0, 360$$

$$34) \tan^2 x \cos x - \tan^2 x = 0$$

$$\tan^2 x (\cos x - 1) = 0$$

$$\tan x = 0 \quad \cos x = 1$$

$$\boxed{0, 180, 360} \quad \boxed{0, 360}$$

$$35) 3 \cos^2 x - 5 \cos x = 1 + 3(1 - \cos^2 x)$$

$$3 \cos^2 x - 5 \cos x = 1 + 3 - 3 \cos^2 x$$
$$+ 3 \cos^2 x \qquad \qquad \qquad + 3 \cos^2 x$$

$$6 \cos^2 x - 5 \cos x - 4 = 0$$

2

$$\left(\cos x - \frac{8}{6}\right) \left(\cos x + \frac{3}{6}\right) = 0$$

$$\cos x = \frac{4}{3}$$

$$\boxed{\text{NS}}$$

$$\cos x = -\frac{1}{2}$$

$$\boxed{x = 120, 240}$$

$$36) 1 + \cos x = 2 \sin^2 x$$

$$1 + \cos x = 2(1 - \cos^2 x)$$

$$1 + \cos x = 2 - 2 \cos^2 x$$

$$2 \cos^2 x + \cos x - 1 = 0$$

$$\left(\cos x + \frac{2}{2}\right) \left(\cos x - \frac{1}{2}\right) = 0$$

$$\cos x = -1$$

$$\boxed{x = 180}$$

$$\cos x = \frac{1}{2}$$

$$\boxed{60, 300}$$

$$37) 1 + \cos x - 2(1 - \cos^2 x) = 0$$

$$1 + \cos x - 2 + 2\cos^2 x = 0$$

$$2\cos^2 x + \cos x - 1 = 0$$

$$\left(\cos x + \frac{1}{2}\right)\left(\cos x - \frac{1}{2}\right) = 0$$

$$\cos x = -\frac{1}{2}$$

$$x = 180$$

$$\cos x = \frac{1}{2}$$

$$60, 300$$

$$38) 2\sin^2 x - 3\sin x + 1 = 0$$

$$\left(\sin x - \frac{1}{2}\right)\left(\sin x - 1\right) = 0$$

$$\sin x = 1$$

$$90^\circ$$

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

$$30, 150$$

$$39) \csc^2 x - 1 - \csc x = 1$$

$$\csc^2 x - \csc x - 2 = 0$$

$$(\csc x - 2)(\csc x + 1) = 0$$

$$\csc x = 2$$

$$30, 330$$

$$\csc x = -1$$

$$270$$

$$40) 2(1 - \sin^2 x) - 2\sin^2 x = 1$$

$$2 - 2\sin^2 x - 2\sin^2 x = 1$$

~~2~~
~~-2~~

$$2 - 4\sin^2 x = 1$$

$$-2$$

$$-2$$

$$\sin^2 x = \frac{1}{4}$$

$$-4$$

$$-4$$

$$\sqrt{\sin^2 x} = \sqrt{\frac{1}{4}}$$

$$\sin x = \pm \frac{1}{2}$$

$$\sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}$$

$$30, 120, 240, 330$$

$$41). \sec^2 x + 3\sec x + 2 = 0$$

$$(\sec x + 2)(\sec x + 1) = 0$$

$$\sec x = -2 \quad \sec x = -1$$

$$120, 240 \quad 180$$

$$42) 3\tan^2 x - 1 = 0$$

$$+1 \quad +1$$

$$\frac{3\tan^2 x = 1}{3}$$

$$\sqrt{\frac{1}{3}} = \frac{\sqrt{1}}{\sqrt{3}}$$

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\sqrt{\tan^2 x} = \frac{\sqrt{1}}{\sqrt{3}}$$

$$\tan x = \pm \frac{\sqrt{3}}{3}$$

$$150, 30, 210, 330$$