

$$\begin{aligned} \textcircled{1} \tan(x + 3\pi) &= \frac{\tan x + \tan(3\pi)}{1 - \tan x \cdot \tan(3\pi)} \\ &= \frac{\tan x + 0}{1 - \tan x \cdot 0} \\ &= \tan x \end{aligned}$$

$$\begin{aligned} \textcircled{2} \cos\left(\frac{\pi}{2} - x\right) &= \cos\frac{\pi}{2} \cdot \cos x + \sin\frac{\pi}{2} \cdot \sin x \\ &= 0 \cdot \cos x + 1 \cdot \sin x \\ &= \sin x \end{aligned}$$

$$\textcircled{3} \frac{\sin 2x}{\sin x} - \frac{\cos 2x}{\cos x} = \sec x$$

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

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

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

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

$$\sec x = \sec x$$

$$\begin{aligned} \textcircled{4} \cos(195^\circ) &= \cos(150 + 45) \\ &= \cos 150 \cos 45 - \sin 150 \sin 45 \\ &= -\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2} \\ &= \frac{-\sqrt{6} - \sqrt{2}}{4} \end{aligned}$$

$$\textcircled{5} \tan(75^\circ)$$

$$\begin{aligned} &\tan(45 + 30) \\ &= \frac{\tan 45 + \tan 30}{1 - \tan 45 \cdot \tan 30} \\ &= \frac{1 + \frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}} \quad \text{or} \quad \frac{\sqrt{3} + 1}{\sqrt{3} - 1} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \sin\left(\frac{17\pi}{12}\right) &= \sin\left(\frac{9\pi}{12} + \frac{8\pi}{12}\right) \\ &= \sin\left(\frac{3\pi}{4} + \frac{2\pi}{3}\right) \end{aligned}$$

$$= \sin \frac{3\pi}{4} \cdot \cos \frac{2\pi}{3} + \cos \frac{3\pi}{4} \cdot \sin \frac{2\pi}{3}$$

$$= \frac{\sqrt{2}}{2} \cdot -\frac{1}{2} + -\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2}$$

$$= \frac{-\sqrt{2} - \sqrt{6}}{4}$$

$$\begin{aligned}
 \textcircled{7} \quad & \sin 42 \cos 12 - \cos 42 \sin 12 \\
 & = \sin(42 - 12) \\
 & = \sin 30 \\
 & = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{8} \quad & \cos(15) \cos 60 + \sin 15 \sin 60 \\
 & \cos(15 - 60) \\
 & \cos(-45) \\
 & \frac{\sqrt{2}}{2}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{9} \quad & \sin \frac{\pi}{2} \cdot \cos \frac{\pi}{2} + \cos \frac{\pi}{2} \cdot \sin \frac{\pi}{2} \\
 & \sin\left(\frac{\pi}{2} + \frac{\pi}{2}\right) \\
 & \sin\left(\frac{\pi}{2} + \frac{3\pi}{2}\right) \\
 & \sin\left(\frac{4\pi}{2}\right) \\
 & \sin\left(\frac{\pi}{2}\right) \\
 & \frac{\sqrt{3}}{2}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{10} \quad & \cos \frac{\pi}{6} \cos \frac{3\pi}{6} - \sin \frac{\pi}{6} \sin \frac{3\pi}{6} \\
 & \cos\left(\frac{\pi}{6} + \frac{3\pi}{6}\right) \\
 & \cos\left(\frac{4\pi}{6}\right) \\
 & \cos\left(\frac{2\pi}{3}\right) \\
 & \frac{\sqrt{2}}{2}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{11} \quad & \frac{\tan 25 + \tan 110}{1 - \tan 25 \cdot \tan 110} \\
 & \tan(25 + 110) \\
 & \tan(135) \\
 & -1
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{12} \quad & \frac{\tan \frac{5\pi}{4} - \tan \frac{\pi}{2}}{1 + \tan \frac{5\pi}{4} \cdot \tan \frac{\pi}{2}} \\
 & \tan\left(\frac{5\pi}{4} - \frac{\pi}{2}\right) \\
 & \tan\left(\frac{15\pi}{12} - \frac{\pi}{2}\right) \\
 & \tan\left(\frac{14\pi}{12}\right) \\
 & \tan\left(\frac{7\pi}{6}\right) \\
 & -\frac{\sqrt{3}}{3}
 \end{aligned}$$

$$\textcircled{13} \quad 2 \sin^2 x - \sin x - 1 = 0$$

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

$$\left. \begin{aligned} \sin x &= -\frac{1}{2} \\ X &= \frac{7\pi}{6}, \frac{11\pi}{6} \end{aligned} \right\} \begin{aligned} \sin x &= 1 \\ X &= \frac{\pi}{2} \end{aligned}$$

$$\textcircled{15} \quad 2 \cos x = -\sin 2x$$

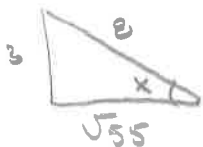
$$2 \cos x + \sin 2x = 0$$

$$2 \cos x + 2 \sin x \cdot \cos x = 0$$

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

$$\left. \begin{aligned} 2 \cos x &= 0 \\ \cos x &= 0 \\ X &= \frac{\pi}{2}, \frac{3\pi}{2} \end{aligned} \right\} \begin{aligned} 1 + \sin x &= 0 \\ \sin x &= -1 \\ X &= \frac{3\pi}{2} \end{aligned}$$

$$\textcircled{17} \quad \sin x = \frac{3}{8} \quad x \in \text{QIV}$$



$$\cos x = -\frac{\sqrt{55}}{8}$$

$$\begin{aligned} \cos 2x &= \left(-\frac{\sqrt{55}}{8}\right)^2 - \left(\frac{3}{8}\right)^2 \\ &= \frac{55}{64} - \frac{9}{64} \\ &= \frac{46}{64} \\ &= \frac{23}{32} \end{aligned}$$

$$\begin{aligned} \sin 2x &= 2\left(\frac{3}{8}\right)\left(-\frac{\sqrt{55}}{8}\right) \\ &= \frac{-6\sqrt{55}}{64} \\ &= \frac{-3\sqrt{55}}{32} \end{aligned}$$

$$\begin{aligned} \tan 2x &= \frac{-3\sqrt{55}}{32} \\ &= \frac{23}{32} \\ &= \frac{-3\sqrt{55}}{23} \end{aligned}$$

Quad IV $\left\{ \begin{array}{l} \cos 2x \text{ Pos} \\ \sin 2x \text{ neg} \end{array} \right.$

$$\textcircled{18} \quad \frac{\tan x}{1 + \tan^2 x} = \sin x \cdot \cos x$$

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

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

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

$$\sin x \cdot \cos x = \sin x \cdot \cos x$$

\Rightarrow

$$(14) \sin x + \sin x \cdot \cot x = 0$$

$$\sin x (1 + \cot x) = 0$$

$$\sin x = 0 \quad \left\{ \begin{array}{l} 1 + \cot x = 0 \\ \cot x = -1 \\ \tan x = -1 \\ x = \frac{3\pi}{4}, \frac{7\pi}{4} \end{array} \right.$$

$$x = 0, \pi, 2\pi$$

$$\cot x = -1$$

$$\tan x = -1$$

$$x = \frac{3\pi}{4}, \frac{7\pi}{4}$$

$$(16) -2\sin^2 x - 5\cos x + 4 = 0$$

$$-2(1 - \cos^2 x) - 5\cos x + 4 = 0$$

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

$$2\cos^2 x - 5\cos x + 2 = 0$$

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

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

$$\cos x = 2$$

$$x = \frac{\pi}{3}, \frac{5\pi}{3}$$

No solution

$$(19) \tan^2 x + 1 + \tan x \cdot \sec x = \frac{1 + \sin x}{\cos^2 x}$$

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

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

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