

$$19. \sin 3x = (\sin x)(4\cos^2 x - 1)$$

$$\sin(2x+x)$$

$$\sin 2x \cos x + \cos 2x \sin x$$

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

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

$$\sin x(4\cos^2 x - 1)$$

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$$9. \sin 2x - \tan x = 0$$

$$2\sin x \cos x - \tan x = 0$$

$$2\sin x \cos x - \frac{\sin x}{\cos x} = 0$$

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

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

$$x = 0, \pi$$

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

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

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

$$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

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34.  $\sin\left(\frac{5\pi}{12}\right)$

$\sin\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 - \cos u}{2}}$

$2\left(\frac{5\pi}{12}\right) = \left(\frac{u}{2}\right) \times 2$

$\frac{10\pi}{12}$

$\frac{5\pi}{6} = u$

$\sin\frac{5\pi}{12} = \pm \sqrt{\frac{1 - \cos\left(\frac{5\pi}{6}\right)}{2}}$

$\sin\frac{5\pi}{12} = \oplus \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}}$

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36.  $\cos\left(\frac{\pi}{8}\right)$

$\cos\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 + \cos u}{2}}$

$\frac{\pi}{8} = \frac{u}{2}$

$u = \frac{\pi}{4}$

$\cos\frac{\pi}{8} = \pm \sqrt{\frac{1 + \cos\frac{\pi}{4}}{2}}$

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

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$$24. \cos 2x + \sin x = 0$$

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

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

$$2\sin^2 x - \sin x - 1 = 0$$

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

$$2\sin x + 1 = 0 \quad \sin x - 1 = 0$$

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

$$x = \frac{11\pi}{6}, \frac{7\pi}{6} \quad x = \frac{\pi}{2}$$

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