Trig Equations with Identities

only replace square

$15\cos^2\theta + 2\sin\theta - 14 = 0$ over [0°, 360°]

$15(1-\sin^2\theta) + 2\sin\theta - 14 = 0$

$15 - 15\sin^2\theta + 2\sin\theta - 14 = 0$

$15\sin^2\theta - 2\sin\theta - 1 = 0$

$(3\sin\theta - 1)(5\sin\theta + 1) = 0$

$\sin\theta = \frac{1}{3}$ $\quad\sin\theta = -\frac{1}{5}$

$\theta_r = 19.471°$ $\quad\theta_r = 11.537°$

$\theta = 19.471°, 160.529°, 191.537°, 348.463°$

$\underbrace{1 - \sin^2 x} = 3\cos x - 2$ over $[0, 2\pi)$

$0 \le x < 2\pi$

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

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

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

$\cancel{\cos x = 2}$ $\quad\cos x = 1$

$\boxed{x = 0}$

Solve for x exactly. $\left[0, \frac{3\pi}{2}\right)$ not 4

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

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

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

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

$$\boxed{x = \frac{\pi}{2} \qquad x = \frac{7\pi}{6}}$$

Solve for θ:

$4\cos(2\theta) + 2 = 0$ general solution

$4(1 - 2\sin^2\theta) + 2 = 0$

$4 - 8\sin^2\theta + 2 = 0$

$\sqrt{\sin^2\theta} = \sqrt{\frac{3}{4}}$

$\sin\theta = \pm\frac{\sqrt{3}}{2}$

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

$8\cos^2\theta - 4 + 2 = 0$

$\cos^2\theta = \frac{1}{4}$

$\cos\theta = \pm\frac{1}{2}$

$\theta = \frac{\pi}{3} + 2\pi k$

$\theta = \frac{2\pi}{3} + 2\pi k$

$\theta = \frac{4\pi}{3} + 2\pi k$ $k \in \mathbb{Z}$

$\theta = \frac{5\pi}{3} + 2\pi k$