

Solve the equation on the interval of $[0, 2\pi]$

$$1. \cos 2\theta = -\frac{1}{2}$$

$$2\theta = 120 \pm 360k \quad 2\theta = 240 \pm 360k$$

$$\theta = 60 \pm 180k \quad \theta = 120 \pm 180k$$

$$60, 240, \quad 120, 300,$$

$$3. \sec \frac{3\theta}{2} = -2$$

$$\frac{3\theta}{2} = 120 \pm 360k \quad \frac{3\theta}{2} = 240 \pm 360k$$

$$\theta = 80 \pm 240k \quad \theta = 160 \pm 240k$$

$$80, 320 \quad 160$$

$$5. \cos \left(2\theta - \frac{\pi}{2} \right) = -1$$

$$\cos \theta = -1$$

$$2\theta - 90 = 180$$

$$2\theta = 270$$

$$\theta = 135$$

$$7. \tan \left(\frac{\theta}{2} + \frac{\pi}{3} \right) = 1$$

$$2. \tan 2\theta = -1$$

$$\frac{2\theta}{2} = \frac{135 \pm 180k}{2} \quad \frac{2\theta}{2} = \frac{315 \pm 180k}{2}$$

$$\theta = 67.5 \pm 90k \quad \theta = 157.5 \pm 90k$$

$$67.5, 157.5, 247.5$$

$$337.5$$

$$4. \cot \frac{2\theta}{3} = -\sqrt{3}$$

$$\frac{2\theta}{3} = 150 \pm 180k$$

$$\theta = 225 \pm 270k$$

$$\boxed{225}$$

$$6. \sin \left(3\theta + \frac{\pi}{18} \right) = 1$$

$$\sin \left(3\theta + 10 \right) = 1$$

$$3\theta + 10 = 90$$

$$3\theta = 80$$

$$\theta = \frac{80}{3}$$

$$\frac{\pi}{18} = \frac{180}{18}$$

$$\frac{180}{18} = 10^\circ$$