

8-2A

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19 $\cos x = -1$

$(-1, 0) \rightarrow$

$x = \pi + 2n\pi$

$n=0 \rightarrow x = \pi$

$n=1 \rightarrow x = \pi + 2\pi = 3\pi > 2\pi$

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

$2x = \pi + 2n\pi$

$x = \frac{\pi}{2} + n\pi$

$n=0 \rightarrow x = \frac{\pi}{2}$

$n=1 \rightarrow x = \frac{\pi}{2} + \pi = \frac{3\pi}{2}$

$n=2 \rightarrow x = \frac{\pi}{2} + 2\pi = \frac{5\pi}{2}$

(c) $\cos 3x = -1$

$3x = \pi + 2n\pi$

$x = \frac{\pi}{3} + \frac{2n\pi}{3}$

$n=0 \rightarrow x = \frac{\pi}{3}$

$n=1 \rightarrow x = \frac{\pi}{3} + \frac{2\pi}{3} = \pi$

$n=2 \rightarrow x = \frac{\pi}{3} + \frac{4\pi}{3} = \frac{5\pi}{3}$

$n=3 \rightarrow x = \frac{\pi}{3} + \frac{6\pi}{3} = 2\pi$

 $> 2\pi$

21 $8 \cos 2x = 1$

$\cos 2x = \frac{1}{8}$

$\theta = 2x$

$\cos \theta = \frac{1}{8}$

Q I: $\theta = \cos^{-1}(\frac{1}{8}) \approx 1.45$

Q IV: $\theta = 2\pi - \cos^{-1}(\frac{1}{8}) \approx 4.84$

$2x = 1.45 + 2n\pi$

$x = 0.73 + n\pi$

$n=0 \rightarrow x = 0.73$

$n=1 \rightarrow x = 3.87$

$2x = 4.84 + 2n\pi$

$x = 2.42 + n\pi$

$x = 2.42$

$x = 5.56$

(23) $3 \sin \frac{x}{2} = -1 \quad \theta = \frac{x}{2}$

$3 \sin \theta = -1 \rightarrow \sin \theta = -\frac{1}{3}$

Q III: $\theta \approx \pi + \sin^{-1}(\frac{1}{3}) \approx 3.4814$

Q IV: $\theta = 2\pi - \sin^{-1}(\frac{1}{3}) \approx 5.9433$

$\frac{x}{2} = 3.4814 \dots$

$\frac{x}{2} = 5.9433 \dots$

$x = 6.96$

$x = 11.89$

 $> 2\pi$ $> 2\pi$ \rightarrow no solution

20 $2 \sin x = 1$

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

Q I: $x = \frac{\pi}{6}$

Q II: $x = \frac{5\pi}{6}$

(b) $2 \sin 2x = 1$

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

$2x = \frac{\pi}{6} + 2n\pi$

$x = \frac{\pi}{12} + n\pi$

$n=0 \rightarrow \frac{\pi}{12}$

$n=1 \rightarrow \frac{13\pi}{12}$

 $n=2 \rightarrow$ too big

$2x = \frac{5\pi}{6} + 2n\pi$

$x = \frac{5\pi}{12} + n\pi$

$n=0 \rightarrow \frac{5\pi}{12}$

$n=1 \rightarrow \frac{17\pi}{12}$

 $n=2 \rightarrow$ too big

$$20c. \quad 2 \sin \frac{x}{2} = 1$$

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

$$\frac{x}{2} = \frac{\pi}{6} + 2n\pi$$

$$x = \frac{\pi}{3} + 4n\pi$$

$$n=0 \rightarrow \boxed{\frac{\pi}{3}}$$

$n=1$ too big

$$\frac{x}{2} = \frac{5\pi}{6} + 2n\pi$$

$$x = \frac{5\pi}{3} + 4n\pi$$

$$n=0 \rightarrow \boxed{\frac{5\pi}{3}}$$

$n=1$ too big

$$22. \quad 5 \sin 3x = -2 \quad \theta = 3x$$

$$\sin 3x = -\frac{2}{5} \rightarrow \sin \theta = -\frac{2}{5}$$

$$Q III: \theta = \pi + \sin^{-1}\left(\frac{2}{5}\right)$$

$$= 3.5531095$$

$$3x = 3.5531095 + 2n\pi$$

$$x = 1.18 + \frac{2n\pi}{3}$$

$$n=0 \rightarrow \boxed{1.18}$$

$$n=1 \rightarrow 1.18 + \frac{2\pi}{3} \approx \boxed{3.27}$$

$$n=2 \rightarrow 1.18 + \frac{4\pi}{3} \approx \boxed{5.37}$$

$$Q IV: \theta = 2\pi - \sin^{-1}\left(\frac{2}{5}\right)$$

$$\theta \approx 5.871668461$$

$$3x = 5.871668461 + 2n\pi$$

$$x = 1.96 + \frac{2n\pi}{3}$$

$$\boxed{1.96}$$

$$1.96 + \frac{2\pi}{3} \approx \boxed{4.05}$$

$$1.96 + \frac{4\pi}{3} \approx \boxed{6.15}$$

$$24 \quad 1.5 \cos \frac{x}{2} = \frac{1}{2} \rightarrow \cos \frac{x}{2} = \frac{1}{2} \div \frac{3}{2} = \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$$

$$\theta = \frac{x}{2} \rightarrow \cos \theta = \frac{1}{3}$$

$$Q I: \theta = \cos^{-1}\left(\frac{1}{3}\right)$$

$$1.230959417$$

$$\frac{x}{2} = 1.230959417 + 2n\pi$$

$$x = 2.46 + 4n\pi$$

$$\boxed{x = 2.46}$$

$$Q IV: \theta = 2\pi - \cos^{-1}\left(\frac{1}{3}\right)$$

$$\approx 5.05222589$$

$$\frac{x}{2} = 5.05222589 + 2n\pi$$

$$x = 10.10$$

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$$\text{OE } 2 \quad \sin \theta = -4 \rightarrow \text{no sol}$$

$$4 \quad \cot \theta = -1 \rightarrow \tan \theta = -1$$

$$\text{Q II } 135^\circ$$

$$\text{Q IV } 315^\circ$$

$$8 \quad \sec x = \frac{1}{2}$$

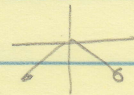
$$\cos x = 2 \rightarrow \text{no sol}$$

$$12 \quad m = \tan 140^\circ = -0.8391$$

$$\textcircled{6} \quad \cot x = 1 \rightarrow \tan x = 1$$

$$\text{Q I } x = \frac{\pi}{4}$$

$$\text{Q III } x = \frac{5\pi}{4}$$



$$\textcircled{10} \quad \sin \theta = -\frac{\sqrt{2}}{2}$$

$$\text{Q III } 225^\circ \rightarrow \theta = 225^\circ + n \cdot 360^\circ$$

$$\text{Q IV } 315^\circ \rightarrow \theta = 315^\circ + n \cdot 360^\circ$$

n is an integer