

Solve each equation over the interval  $[0^\circ, 360^\circ)$ . If necessary, round answers to the nearest hundredths.

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

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

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

$2x = 90^\circ$   
 $45^\circ$   
 $x = 45^\circ$

$2x = 270^\circ$   
 $x = 135^\circ$

$2x = 450^\circ$   
 $x = 225^\circ$

$2x = 630^\circ$   
 $x = 315^\circ$

~~$2x = 720^\circ$   
 $x = 360^\circ$~~

$210^\circ, 330^\circ$

2.)  $2 \sin 2x = \sin 2x \cos x$

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

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

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

$2x = 0$   
 $x = 0^\circ$

$2x = 180^\circ$   
 $x = 90^\circ$

$2x = 360^\circ$   
 $x = 180^\circ$

$2x = 540^\circ$   
 $x = 270^\circ$

$\emptyset$

3.)  $2 \cos 2x \sin x + \sqrt{2} \cos 2x = 0$

$3 \cot 2x \tan x + \sqrt{3} \cot 2x = 0$

$\cot 2x (3 \tan x + \sqrt{3}) = 0$

$\cot 2x = 0 \quad \tan x = -\frac{\sqrt{3}}{3}$

$2x = 90^\circ$   
 $x = 45^\circ$

$2x = 270^\circ$   
 $x = 135^\circ$

$2x = 450^\circ$   
 $x = 225^\circ$

$2x = 630^\circ$   
 $x = 315^\circ$

$150^\circ$   
 $330^\circ$

4.)  $\tan 4x \csc x = 2 \tan 4x$

$\tan 4x \csc x - 2 \tan 4x = 0$

$\tan 4x (\csc x - 2) = 0$

$\tan 4x = 0 \quad \csc x = 2$

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

$4x = 0$   
 $x = 0^\circ$

$4x = 180^\circ$   
 $x = 45^\circ$

$4x = 360^\circ$   
 $x = 90^\circ$

$4x = 540^\circ$   
 $x = 135^\circ$

$4x = 720^\circ$   
 $x = 180^\circ$

$4x = 900^\circ$   
 $x = 225^\circ$

$4x = 1080^\circ$   
 $x = 270^\circ$

$4x = 1260^\circ$   
 $x = 315^\circ$

$x = 30^\circ$   
 $x = 150^\circ$

Solve each equation over the interval  $[0, 2\pi)$ . If necessary, round answers to the nearest hundredths.

$$5.) \quad \sqrt{3} \tan \frac{x}{2} - 1 = 0$$

$$\tan \frac{x}{2} = \frac{1}{\sqrt{3}}$$

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

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

$$\boxed{x = \frac{\pi}{3}}$$

$$\cancel{x = \frac{7\pi}{3}}$$

$$6.) \quad \sec 2x \sin x = \sqrt{2} \sin x$$

$$\sec 2x \sin x - \sqrt{2} \sin x = 0$$

$$\sin x (\sec 2x - \sqrt{2}) = 0$$

$$\sin x = 0$$

$$\sec 2x = \sqrt{2}$$

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

$$\boxed{0, \pi}$$

$$2x = \frac{\pi}{4}$$

$$2x = \frac{7\pi}{4}$$

$$\boxed{x = \frac{\pi}{8}}$$

$$\boxed{x = \frac{7\pi}{8}}$$

$$2x = \frac{9\pi}{4}$$

$$2x = \frac{15\pi}{4}$$

$$\boxed{x = \frac{9\pi}{8}}$$

$$\boxed{x = \frac{15\pi}{8}}$$

$$7.) \quad \sqrt{3} \cot x + 2 \cos \frac{x}{2} \cot x = 0$$

$$\cot x (\sqrt{3} + 2 \cos \frac{x}{2}) = 0$$

$$\cot x = 0$$

$$\cos \frac{x}{2} = -\frac{\sqrt{3}}{2}$$

$$\boxed{\frac{\pi}{2}, \frac{3\pi}{2}}$$

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

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

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

$$\cancel{x = \frac{7\pi}{3}}$$

$$8.) \quad (2 \sin 3x - 1)(\tan x + 1) = 0$$

$$\sin 3x = \frac{1}{2} \quad \tan x = -1$$

$$3x = \frac{\pi}{6}$$

$$3x = \frac{5\pi}{6}$$

$$\boxed{x = \frac{\pi}{18}}$$

$$\boxed{x = \frac{5\pi}{18}}$$

$$\boxed{\frac{3\pi}{4}, \frac{7\pi}{4}}$$

$$3x = \frac{13\pi}{6}$$

$$3x = \frac{17\pi}{6}$$

$$\boxed{x = \frac{13\pi}{18}}$$

$$\boxed{x = \frac{17\pi}{18}}$$

$$3x = \frac{25\pi}{6}$$

$$3x = \frac{29\pi}{6}$$

$$\boxed{x = \frac{25\pi}{18}}$$

$$\boxed{x = \frac{29\pi}{18}}$$