Warm Up

Solve for x over the interval $[0, 2\pi)$.

$$3\overset{a}{\sec} x - 5\overset{t}{\tan} x \overset{a}{\sec} x = 0$$

$3a - 5ta = 0$

$a(3 - 5t) = 0$

$\sec x(3 - 5\tan x) = 0$

$\sec x = 0$

$\cos x =$ undefined

DNE

$\tan x = 3/5$

Day 1

6.3

Solving Trig Equations with Multiple Angles

Solve each equation over the interval [0°, 360°).

1.) $\cos(2x) = \frac{1}{2}$

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

$\theta = 60^\circ$

$\frac{2x}{2} = \frac{60^\circ}{2}$

$\frac{2x}{2} = \frac{420^\circ}{2}$

$+360^\circ$

$\theta = 300^\circ$

$\frac{2x}{2} = \frac{300^\circ}{2}$

$\frac{2x}{2} = \frac{660^\circ}{2}$

$+360^\circ$

$x = 30^\circ, 150^\circ, 210^\circ, 330^\circ$

Solve each equation over the interval [0°, 360°).

2.) $\sqrt{3}\csc\frac{x}{2} = 2$

$\frac{\sqrt{3}\csc\frac{x}{2}}{\sqrt{3}} = \frac{2}{\sqrt{3}}$

$\theta = 60^\circ, 120^\circ$

$\frac{x}{2} = 60^\circ \cdot 2, 120^\circ \cdot 2$

$x = 120^\circ, 240^\circ$

$\csc\theta = \frac{2}{\sqrt{3}}$

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

Solve each equation over the interval [0, 2π).

3.) $\sec \frac{x}{2} = 2$

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

$\theta = \frac{\pi}{3}, \frac{5\pi}{3} \rightarrow \cancel{2}\cdot\frac{x}{\cancel{2}} = \frac{\pi}{3}\cdot 2, \frac{5\pi}{3}\cdot 2$

$\frac{2\pi}{3}, \cancel{\frac{10\pi}{3}}$

Solve each equation over the interval [0, 2π).

4.) $\cot^2 2x - 1 = 0$

$\sqrt{\cot^2\theta} = \sqrt{1}$

$\cot\theta = \pm 1$

$\tan\theta = \pm 1$

$\theta = \frac{\pi}{4}$ $\theta = \frac{3\pi}{4}$ $\theta = \frac{5\pi}{4}$ $\theta = \frac{7\pi}{4}$

$\frac{1}{2}\cdot 2x = \frac{1}{2}\cdot\frac{\pi}{4} + \frac{8\pi}{4}$ $2x = \frac{3\pi}{4} + \frac{8\pi}{4}$ $2x = \frac{5\pi}{4} + \frac{8\pi}{4}$ $2x = \frac{7\pi}{4} + \frac{8\pi}{4}$

$= \pi/8$ $3\pi/8$ $5\pi/8$ $7\pi/8$

$2x = \frac{9\pi}{4}$ $2x = \frac{11\pi}{4}$ $2x = \frac{13\pi}{4}$ $2x = \frac{15\pi}{4}$

$9\pi/8$ $11\pi/8$ $13\pi/8$ $\frac{15\pi}{8}$