

5-3-3 Solving Trig Equations

using Identities or squaring

Extraneous Solutions: solutions that aren't really solutions.

Check all solutions graphically or by substitution.

Use identities or squaring - always check

EX 5

$$2 \cos^2 x - \sin x - 1 = 0$$

$$2(1 - \sin^2 x) - \sin x - 1 = 0$$

$$2 - 2\sin^2 x - \sin x - 1 = 0$$

$$-2\sin^2 x - \sin x + 1 = 0$$

$$2\sin^2 x + \sin x - 1 = 0$$

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

$$2\sin x = 1$$

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

$$\sin x = -1$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$$

✓ graphically

Intruduced
Potential
Error

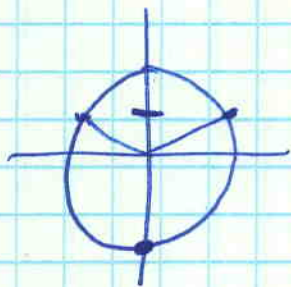
Pythag ID

add 2 - 1

mult by -1

$$2a^2 + a - 1$$
$$(2a - 1)(a + 1)$$

ZPP



EX 6 Solve by Squaring

$$\text{Solve } \csc x - \cot x = 1 \quad [0, 2\pi)$$

$$\cot x + 1 = \csc x$$

relate
 $\cot^2 x + 1 = \csc^2 x$

introduced
potential
error!

$$(\cot x + 1)^2 = \csc^2 x$$

$$\cot^2 x + 2\cot x + 1 = \csc^2 x$$

FOIL

$$\begin{array}{r} \csc^2 x + 2\cot x = \csc^2 x \\ -\csc^2 x \qquad \qquad -\csc^2 x \hline \hline \end{array}$$

Pythag
ID

$$\begin{array}{l} 2\cot x = 0 \\ \cot x = 0 \end{array}$$

Solve for x



$$\boxed{X = \left(\frac{\pi}{2}, \frac{3\pi}{2} \right)} \quad \begin{array}{l} \checkmark \\ X \text{ no sol} \end{array}$$

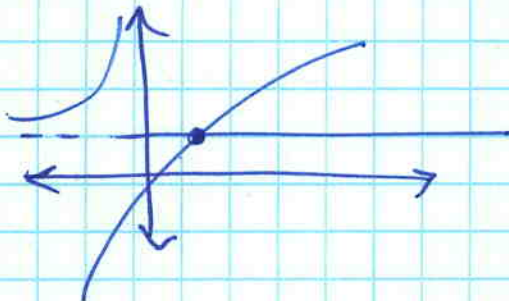
Check by substitution:

$$\csc\left(\frac{\pi}{2}\right) - \cot\left(\frac{\pi}{2}\right) = 1$$

$$1 - 0 = 1 \quad \checkmark$$

$$\csc\left(\frac{3\pi}{2}\right) - \cot\left(\frac{3\pi}{2}\right) = 1$$

$$-1 - 0 \neq 1 \quad \times$$



331: 21-26, 45

check answers!