How do we know if a

trig equation has an

EXTRANEOUS SOLUTION ?!?!

<u>Warm-up</u>:
Solve over $[0, 2\pi)$.

$\cos x \cot x + \cot x = 0$

$\cot x (\cos x + 1) = 0$

$\cot x = 0 \qquad \cos x + 1 = 0$

$\dfrac{\cos x}{\sin x} = 0 \qquad \cos x = -1$

$\cos x = 0$

$\boxed{x = \dfrac{\pi}{2}, \dfrac{3\pi}{2}}$

$\cancel{x = \pi}$

$\cot \pi = \dfrac{-1}{0}$

undefined!

Select the correct
answer:

~~A)~~ $\dfrac{\pi}{2}, \dfrac{3\pi}{2}$ ~~π~~

B) $\dfrac{\pi}{2}, \dfrac{3\pi}{2}$

C) π

D) none of the
above

Extraneous Solution?

one type of function in the equation? → no worries

mixed functions in the equation?

all sin or cos? → no worries

mixed function including csc, sec, tan, cot?

non-quadrantal solutions? → no worries

quadrantal solutions $x = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$ → Worry! they might be extraneous!
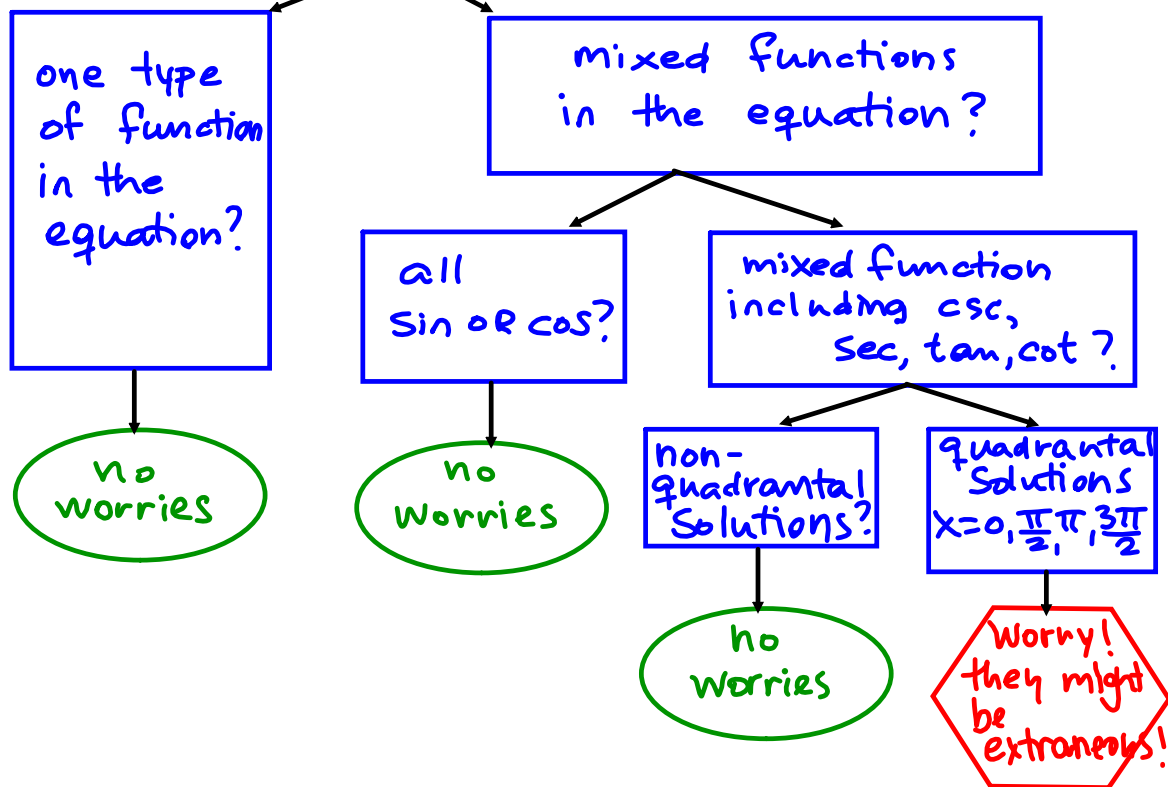
Extra Example:

$$(\cos^2 x - 1)(\cot x + 1) = 0$$

$\cos^2 x - 1 = 0$ $\cot x + 1 = 0$

$\cos^2 x = 1$ $\cot x = -1$

$\cos x = \pm 1$ $\sin x \cdot \dfrac{\cos x}{\sin x} = -1 \cdot \sin x$

$x = \cancel{0}, \cancel{\pi}$ $\cos x = -\sin x$

$\cot 0 = \frac{1}{0} = und.$ $\boxed{x = \dfrac{3\pi}{4}, \dfrac{7\pi}{4}}$

$\cot \pi = -\frac{1}{0} = und.$