Note Title 2/6/2012

A Little More On Verifying Equations

12. $\dfrac{\csc x - 1}{1 - \sin x} = \csc x$

$\dfrac{\csc x - 1}{1 - \sin x} \cdot \dfrac{(1 + \sin x)}{(1 + \sin x)}$ MULTIPY NUM & DENOM BY CONJUGATE

$\dfrac{\left(\frac{1}{\sin x} - 1\right)(1 + \sin x)}{1 - \sin^2 x}$ SUBSTITUTE RECIPROCAL IDENTITY & MULTIPLY

$\dfrac{\frac{1}{\sin x} + 1 - 1 - \sin x}{1 - \sin^2 x}$ MULTIPLY

$$\frac{\frac{1}{\sin x} - \frac{\sin x}{1}}{1-\sin^2 x}$$

ADD

$$\frac{\frac{1}{\sin x} - \frac{\sin^2 x}{\sin x}}{1-\sin^2 x}$$

} COMMON DENOMINATOR

$$\frac{\frac{1-\sin^2 x}{\sin x}}{\frac{1-\sin^2 x}{1}}$$

ADD NUMERATOR

WRITE DENOM. AS FRACTION

$$\frac{1-\sin^2 x}{\sin x} \div \frac{1-\sin^2 x}{1}$$

REWRITE COMPLEX FRACTION AS A DIVISION PROBLEM

$$\frac{1-\sin^2 x}{\sin x} \cdot \frac{1}{1-\sin^2 x}$$

MULTIPY BY RECIROCAL & CANCEL "$1-\sin^2 x$" FACTORS

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

$$\csc x$$

SUBSTITUTE RECIPROCAL IDENTITY

51. $\frac{1}{\cot x + 1} + \frac{1}{\tan x + 1} = 1$

$\frac{1}{(\cot x + 1)(\tan x + 1)}(\tan x + 1) + \frac{1}{(\tan x + 1)(\cot x + 1)}(\cot x + 1)$ FIND COMMON DENOMINATOR

$\frac{\tan x + 1 + \cot x + 1}{\cot x \tan x + \cot x + \tan x + 1}$ ADD FRACTIONS & MULTIPLY THE DENOMINATOR

$\cot x \cdot \tan x = \frac{1}{\tan x} \cdot \frac{\tan x}{1} = 1$

$\frac{\cot x + \tan x + 2}{\cot x + \tan x + 2}$ COMBINE LIKE TERMS & APPLY COMMUTATIVE PROP. OF ADD. SUBSTITUTE & COMBINE LIKE TERMS

$1 = 1$

ANY QUESTIONS ON VERIFYING EQUATIONS?

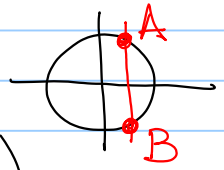
(Short quiz tomorrow → verifying, 5.2 & 5.1 ∵ you need to know the identities)

5.3 : Solving Equations

5.3: 1-47 odd

IS x A SOLUTION?

1. $2\cos x - 1 = 0$ A) $x = \pi/3$ B) $5\pi/3$

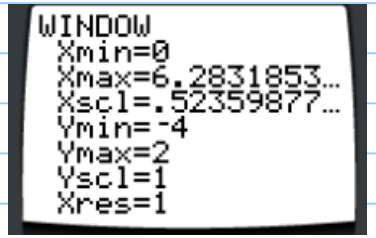


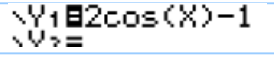
USING THE UNIT ○ : $2\cos x = 1$

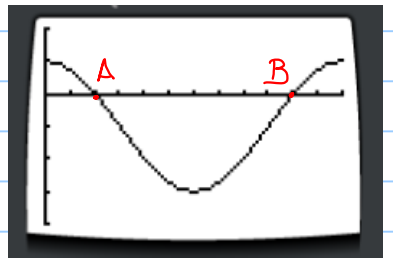
$\cos x = 1/2$

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

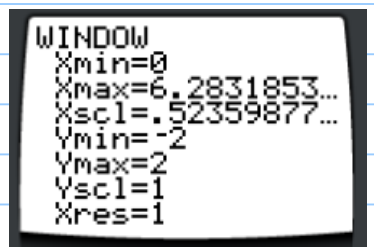
USING A GRAPH & X-INTERCEPTS:

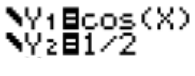


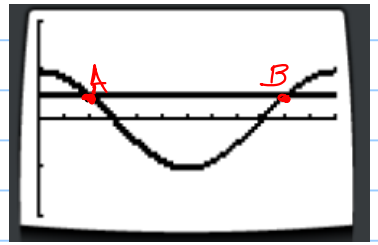




USING A SYSTEM:







YOU ONLY NEED ONE METHOD, BUT OPTIONS EXIST ☺

YOU TRY #5: $2\sin^2 x - \sin x - 1 = 0$

A) $x = \pi/2$ & B) $x = 7\pi/6$

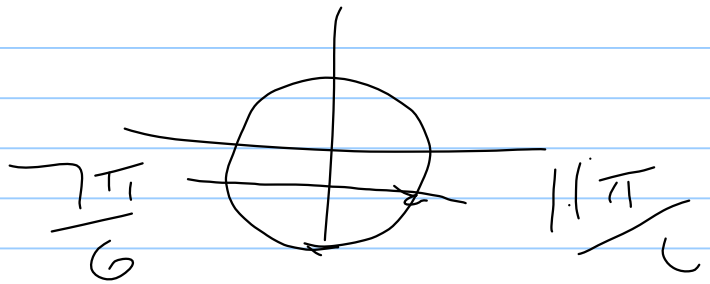
$2a^2 - a - 1 = 0$

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

$2\sin x+1=0$

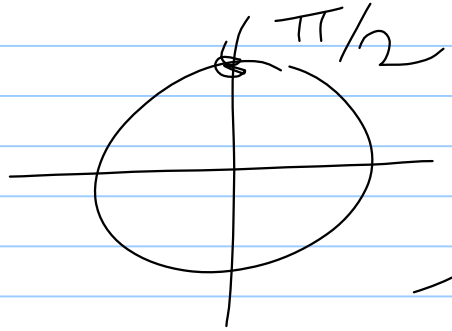
$2\sin x=-1$

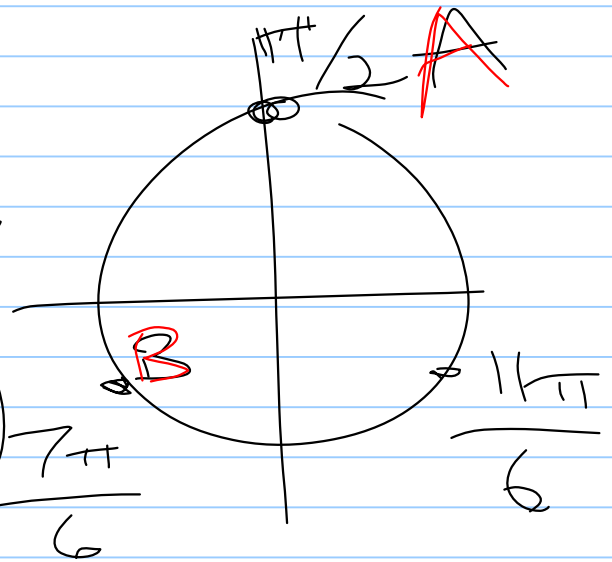
$\sin x=-\frac{1}{2}$



$\sin x-1=0$

$\sin x=1$



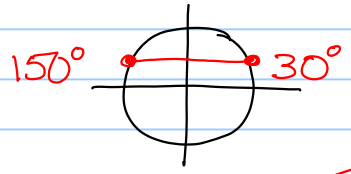


INCLUSIVE

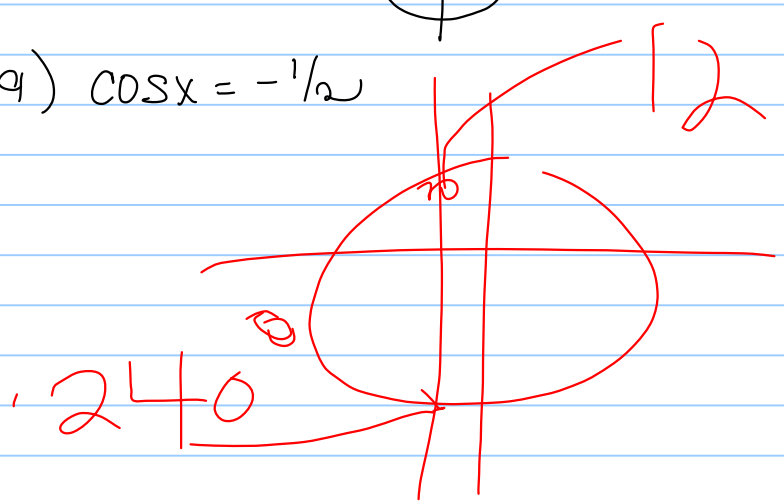
FIND ALL SOLUTIONS FROM $[0°, 360°)$.

7) $\sin x = \frac{1}{2}$ MAY USE ANY METHOD. I LIKE THE UNITCIRCLE.

$x = 30° \& 150°$



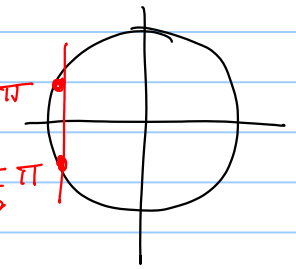
YOU TRY #9) $\cos x = -\frac{1}{2}$



FIND ALL SOLUTIONS FROM $[0, 2\pi)$. USE ANY METHOD.

13. $\cos x = -\sqrt{3}/2$

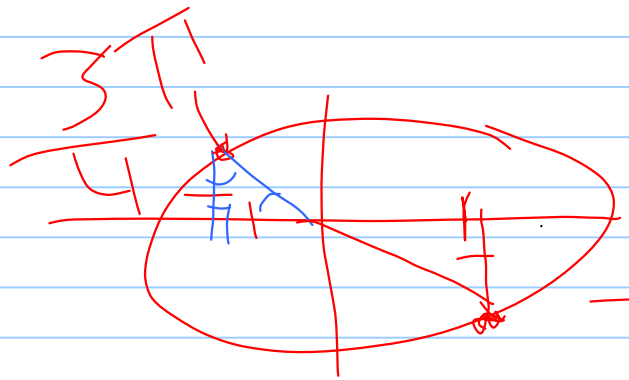
$x = \frac{5}{6}\pi$ & $\frac{7}{6}\pi$



[YOU TRY #15] $\cot x = -1$

$\cot x = \frac{\cos x}{\sin x}$

II	I
$-\sqrt{2}/2$	$\sqrt{2}/2$
IV	I
$\sqrt{2}/2$	$-\sqrt{2}/2$



$7\pi/4$

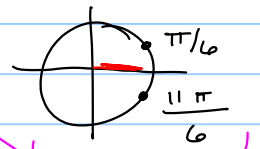
SOLVE*

27) $\sqrt{3}\sec x - 2 = 0$

$\sqrt{3}\sec x = 2$

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

$\cos x = \sqrt{3}/2$



$x = \frac{\pi}{6}$ & $\frac{11\pi}{6}$

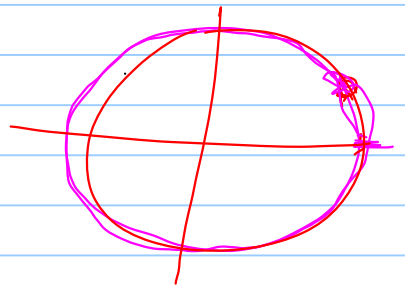
FROM 0 TO 2π

* DIRECTIONS DIDN'T SPECIFY AN INTERVAL,

∴ INFINITE

THESE SOLUTIONS WILL REPEAT EVERY ROTATION, n.

$x = \frac{\pi}{6} + 2\pi n$ & $\frac{11\pi}{6} + 2\pi n$



You try 29) $3\csc^2 x - 4 = 0$

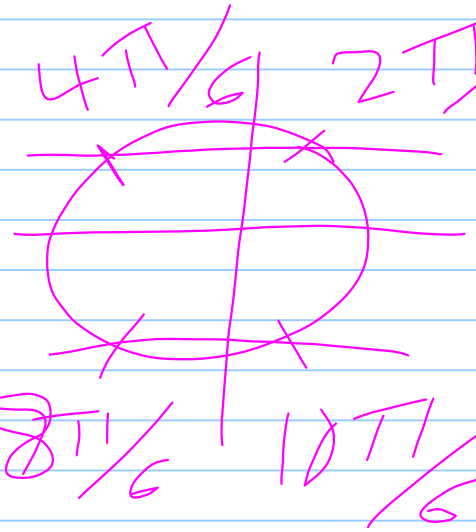
$+4 \quad +4$

$\frac{3\csc^2 x}{3} = \frac{4}{3}$

$\sqrt{\csc^2 x} = \pm\sqrt{\frac{4}{3}}$

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

$\sin x = \pm\frac{\sqrt{3}}{2}$



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

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

$\frac{4\pi}{3} + 2\pi n$

$\frac{5\pi}{3} + 2\pi n$

FIND ALL SOLUTIONS, $[0, 2\pi)$, ALGEBRAICALLY. USE TABLE FEATURE TO CHECK

41) $\sec^2 x - \sec x = 2$

$\sec^2 x - \sec x - 2 = 0$

LOOKS LIKE $a^2 - a - 2 = 0$

FACTORS LIKE $(a-2)(a+1) = 0$

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

MULTIPLICATIVE PROP OF ZERO: IF A PRODUCT EQUALS ZERO THEN AT LEAST ONE OF FACTORS MUST BE ZERO.

IF $\sec x - 2 = 0$ & IF $\sec x + 1 = 0$

THEN $\frac{\sec x}{1} = \frac{2}{1}$ $\quad\quad$ $\frac{\sec x}{1} = \frac{-1}{1}$

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