Wednesday, February 21, 2018
6:12 PM

Precalculus 5.3
Trigonometric Equations (w/ identities)

Name KEY

Date: _____ Per. _____

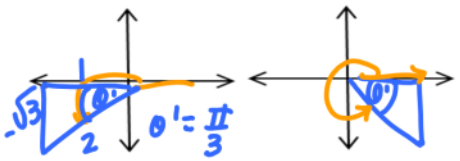
I. Find ***all*** solutions to the following:

1. $2\sin x+\sqrt{3}=0$

$2\sin x=-\sqrt{3}$

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

S|A
T|C



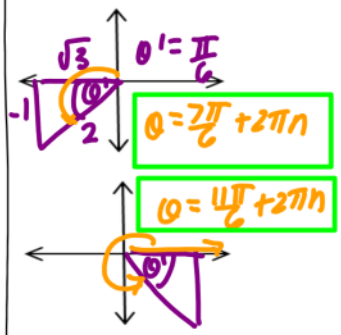
$\theta=\frac{4\pi}{3}+2\pi n$ $\theta=\frac{5\pi}{3}+2\pi n$

* 2. $5\sin\theta+1=3\sin\theta$

$2\sin\theta=-1$

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

S|A
T|C

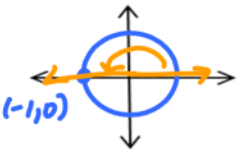


$\theta=\frac{7\pi}{6}+2\pi n$ $\theta=\frac{11\pi}{6}+2\pi n$

* 3. $7\cos\theta+9=-2\cos\theta$

$9\cos\theta=-9$

$\cos\theta=-1$ x



$\theta=\pi+2\pi n$

* see graphs below

II. Solve each of the following quadratic equations over the interval $[0,2\pi)$.

4. $2\sin^2 x=\sin x+3$

$2\sin^2x-\sin x-3=0$

$2x^2-x-3=0$

$(2x-3)(x+1)=0$

$(2\sin x-3)(\sin x+1)=0$

$2\sin x-3=0$ | $\sin x+1=0$

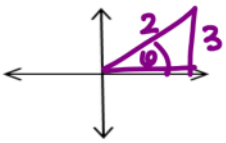
$2\sin x=3$ | $\sin x=-1$

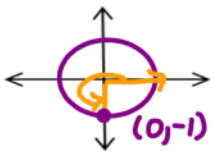
$\sin x=\frac{3}{2}$

S|A
T|C

no solution

$\frac{3}{2}$ is not in the range for sine





$\theta=\frac{3\pi}{2}$

5. $9\tan^2 x-3=0$

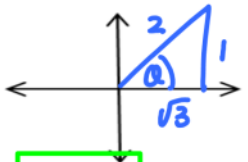
$9\tan^2x=3$

$\sqrt{\tan^2x}=\sqrt{\frac{3}{9}}$

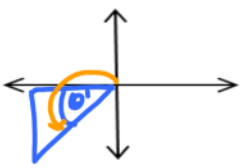
$|\tan x|=\frac{\sqrt{3}}{3}$

$\tan x=\pm\frac{\sqrt{3}}{3}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{3}{3\sqrt{3}}$

$\frac{0}{4}$ $\tan x=\pm\frac{1}{\sqrt{3}}$



$\theta=\frac{\pi}{6}$ $\theta=\frac{5\pi}{6}$



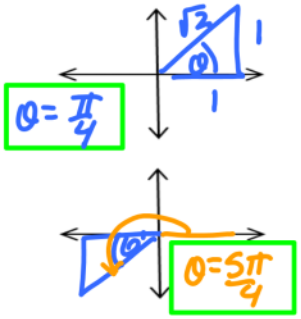
$\theta=\frac{7\pi}{6}$ $\theta=\frac{11\pi}{6}$

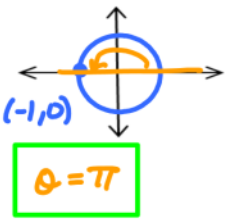
III. Solve each of the following on the interval $[0, 2\pi)$. * see graphs below

6. $(\tan x - 1)(\cos x + 1) = 0$

$\tan x - 1 = 0$ | $\cos x + 1 = 0$

$\tan x = 1$ | $\cos x = -1$





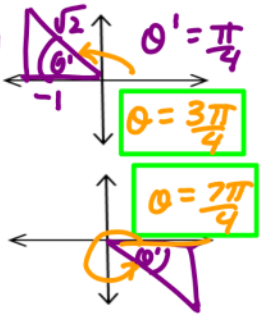
7. $\cot x(\tan x + 1) = 0$

$\cot x = 0$ | $\tan x + 1 = 0$

$\tan x = -1$

$\theta = \frac{\pi}{2}$, $\theta = \frac{3\pi}{2}$

* EXTRANEOUS, not in domain of tan.



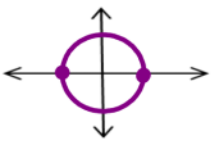
8. $\sin x + 2\sin x \cos x = 0$

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

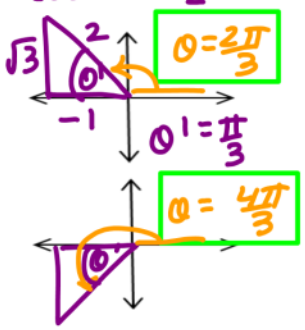
$\sin x = 0$ | $1 + 2\cos x = 0$

$2\cos x = -1$

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



$\theta = 0$, $\theta = \pi$



9. $2\cos^2 x + \sin x - 1 = 0$

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

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

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

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

-1 $\qquad$ -1

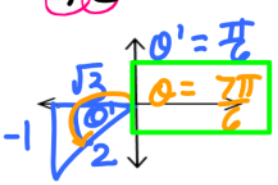
$2\sin^2 x - \sin x - 1 = 0$

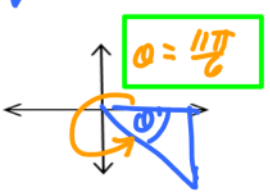
$(2\sin x + 1)(\sin x - 1) = 0$

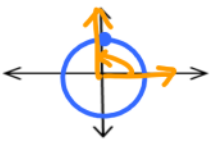
$2\sin x + 1 = 0$ | $\sin x - 1 = 0$

$2\sin x = -1$ | $\sin x = 1$

$\sin x = -1/2$







$\theta = \frac{\pi}{2}$

10. $\sin^2 x - 2\cos x = 2$

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

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

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

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

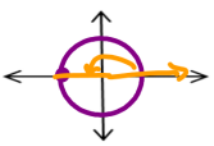
-1 $\qquad$ -1

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

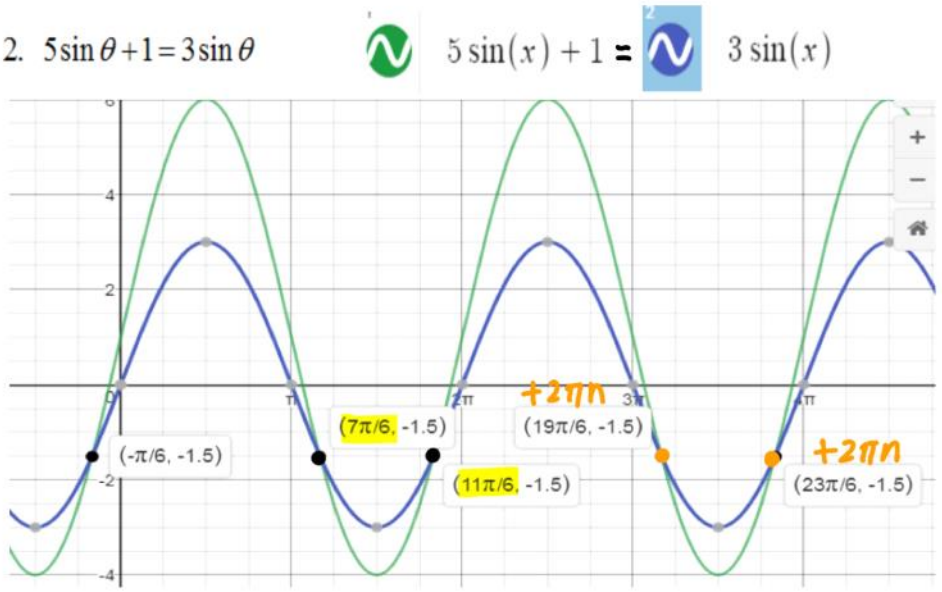
$\cos x + 1 = 0$

$\cos x = -1$

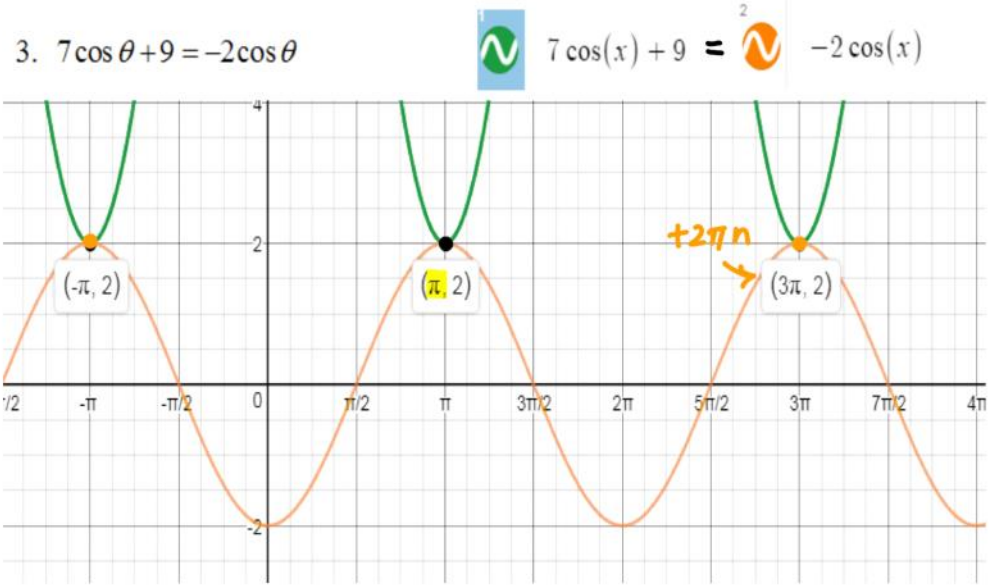
$\theta = \pi$



2. $5\sin\theta+1=3\sin\theta$

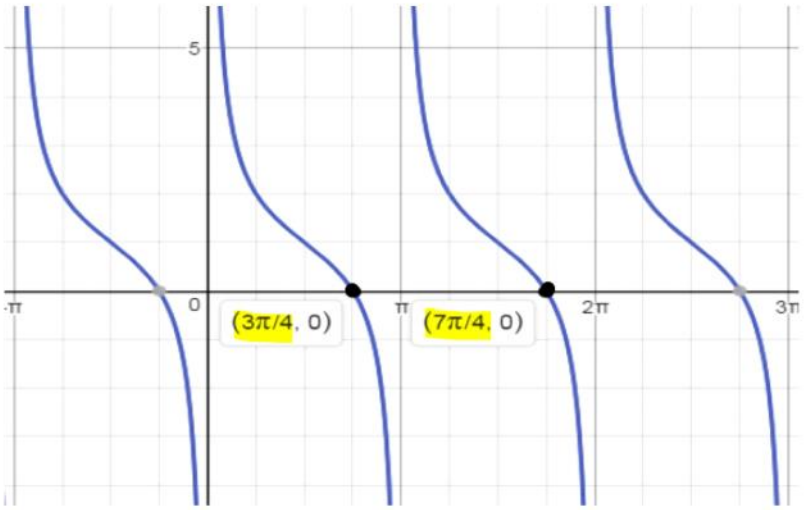


3. $7\cos\theta+9=-2\cos\theta$

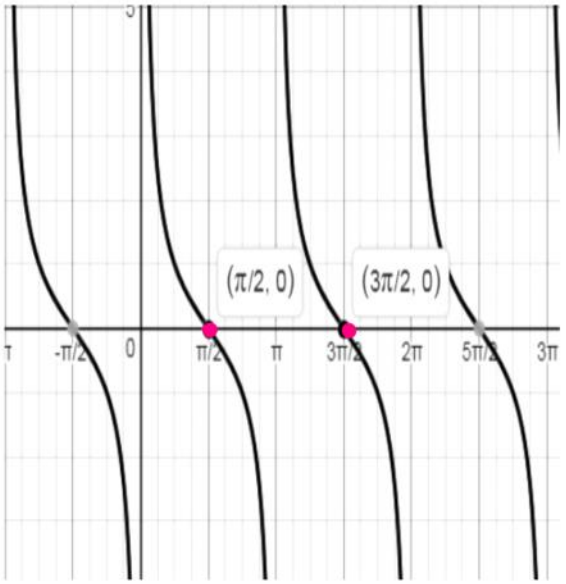
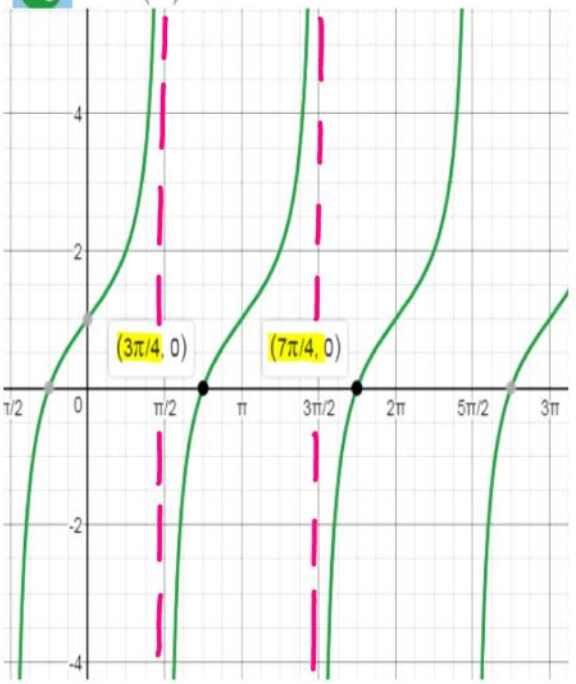


7. $\cot x(\tan x+1)=0$

$\cot(x)\cdot(\tan(x)+1)$



$\cot(x)$



$\tan(x)+1$