

HW 8-7 Classwork Key Posted online

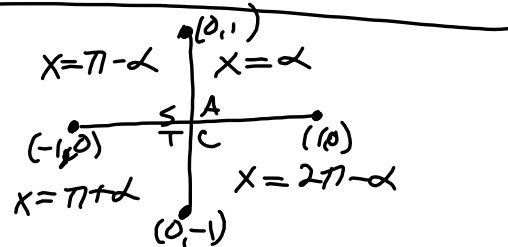
Makeup GHW Quiz

Let's remember:

$$\begin{aligned}\sin^2 x + \cos^2 x &= 1 \\ \sin^2 x &= 1 - \cos^2 x \\ \cos^2 x &= 1 - \sin^2 x\end{aligned}$$

$$\sin 2x = 2 \sin x \cos x$$

	$\pi/6$	$\pi/4$	$\pi/3$
$\sin$	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$
$\cos$	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$
$\tan$	$1/\sqrt{3}$	1	$\sqrt{3}$



$$\begin{array}{c|c} \sin^{-1}(x) & \cos^{-1}(x) \\ \hline \cos^{-1} & \sin^{-1} \\ \tan^{-1} & \tan^{-1} \end{array}$$

Feb 23-8:45 PM

Directions: Solve for x algebraically, given the domain. Show all work. Round to nearest ten thousandths if not exact values

1) $4 \sec x + 8 = 0$, $0 \leq x < 2\pi$

$$\begin{aligned}4 \sec x &= -8 \\ \sec x &= -2 \\ \cos x &= -1/2 \\ \alpha &= \pi/3 \\ \text{II: } x &= 2\pi/3 \\ \text{III: } x &= 4\pi/3 \\ \left\{ \frac{2\pi}{3}, \frac{4\pi}{3} \right\}\end{aligned}$$

2) $3 \cot^2 x - 1 = 0$, $0 \leq x < 2\pi$

$$\begin{aligned}\cot^2 x &= 1/3 \\ \cot x &= \pm \sqrt{1/3} = \pm \frac{1}{\sqrt{3}} \\ \tan x &= \pm \sqrt{3} \\ \alpha &= \frac{\pi}{3} \\ \left\{ \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3} \right\}\end{aligned}$$

3) $3\sin^2 x + 5\sin x = 2$ $0 \leq x < 2\pi$

$$3\sin^2 x + 5\sin x - 2 = 0$$

$$3\sin^2 x + 6\sin x - \sin x - 2 = 0$$

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

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

$\sin x = -2$ impossible reject	$\sin x = 1/3$ $\alpha = \sin^{-1}(1/3)$ $\alpha = .3398$ $I: x = .3398$ $II: x = \pi - \alpha$ $x = 2.8018$
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$$\{.3398, 2.8018\}$$

4) $\cos 2x = \sin x$, $0 \leq x < 2\pi$

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

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

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

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

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

$\sin x = -1$ $x = \pi$	$\sin x = 1/2$ $\alpha = \pi/6$ $I: x = \pi/6$ $II: x = 5\pi/6$
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$$\left\{ \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6} \right\}$$

5) $2\tan x \sin x + 2\sin x = \tan x + 1$, $0 \leq x < 2\pi$

Hint (factor by grouping)

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

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

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

$\tan x = -1$ $\alpha = \pi/4$ $II: 3\pi/4$ $IV: 7\pi/4$	$\sin x = 1/2$ $\alpha = \pi/6$ $I: \pi/6$ $II: 5\pi/6$
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$$\left\{ \frac{3\pi}{4}, \frac{7\pi}{4}, \frac{\pi}{6}, \frac{5\pi}{6} \right\}$$

6) $\sin B = \sin 2B$ $0 \leq B < 2\pi$

$$\sin B = 2\sin B \cos B$$

$$2\sin B \cos B - \sin B = 0$$

$$\sin B (2\cos B - 1) = 0$$

$\sin B = 0$ $B = 0, \pi$	$\cos B = 1/2$ $\alpha = \pi/3$ $I: \pi/3$ $IV: 5\pi/3$
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$$\left\{ 0, \pi, \frac{\pi}{3}, \frac{5\pi}{3} \right\}$$

7) $2\sin^2 x = 2 + \cos x$, $0 \leq x < 2\pi$

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

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

$$\frac{-2 + 2\cos^2 x}{-2 + 2\cos^2 x} = \frac{-2 + \cos x}{-2 + 2\cos^2 x}$$

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

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

$$\cos x = 0$$

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



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

$$\alpha = \frac{\pi}{3}$$

$$\text{II: } 2\pi/3$$

$$\text{III: } 4\pi/3$$

$$\left\{ \frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3} \right\}$$

8) $\cos^2 x - 3\sin x = 2$, $0 \leq x < 2\pi$

$$1 - \sin^2 x - 3\sin x - 2 = 0$$

$$-\sin^2 x - 3\sin x - 1 = 0$$

$$\sin^2 x + 3\sin x + 1 = 0 \quad \text{can't factor}$$

$$\sin x = \frac{-3 \pm \sqrt{9 - 4(1)(1)}}{2(1)}$$

$$\sin x = \frac{-3 \pm \sqrt{5}}{2}$$

$$\sin x = \frac{-3 + \sqrt{5}}{2} = -0.3819$$

$$\alpha = \sin^{-1}(-0.3819)$$

$$\alpha = 0.39192...$$

$$\text{III: } x = \pi + \alpha = 3.5335$$

$$\text{IV: } x = 2\pi - \alpha = 5.8913$$

$$\{3.5335, 5.8913\}$$

$$\sin x = \frac{-3 - \sqrt{5}}{2} = -2.618...$$

Impossible.

reject.