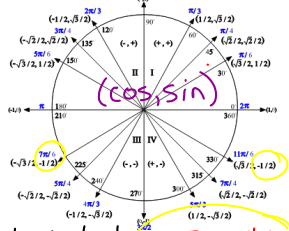
Solving Trig Equations p. 56

- Use algebra techniques to solve trig equations.
- You can take out the trig function, solve for x or θ, and then put the trig function back.
- Answers will be angles in radians from the unit circle



1. $5\sin x + 2 = \sin x$

$5x + 2 = x$ $-x \quad -x$

$4x + 2 = 0$ $-2 \quad -2$

$\frac{4x}{4} = \frac{-2}{4}$

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

*look at unit circle!

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$

2. $5 = \sec^2 x + 3$ Sq. Rt method

$5 = x^2 + 3$ $-3 \quad -3$

$\pm\sqrt{2} = \sqrt{x^2}$ *Remember $\pm\sqrt{}$

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

$\cos x = \pm\frac{1}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} \Rightarrow \cos x = \pm\frac{\sqrt{2}}{2}$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

3. $4\sin^2 x + 1 = 4$

$4x^2 + 1 = 4$

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

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

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

$x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

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4. $2\sin^2 x + \sin x - 1 = 0$ Factor!

$2x^2 + x - 1 = 0$ (O+I)

$(2x-1)(x+1) = 0$ (F, L)

$2x - 1x = x$ ✓

$2x - 1 = 0$ $\quad x + 1 = 0$

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

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

5. $4\sin^2 x - 1 = 0$ Factor w/ Difference of Squares or use square root method

$4x^2 - 1 = 0$

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

$2x+1=0$ $\quad 2x-1=0$

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

$x = \pi/6, 5\pi/6, 7\pi/6, 11\pi/6$

6. $2\cos^2 x - \sin x - 1 = 0$ *Rewrite as 1 trig function

$\sin^2 x + \cos^2 x = 1$

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

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

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

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

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

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

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

$-1 \neq 0$ $\quad 2x-1=0$ $\quad x+1=0$

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

$\sin x = 1/2$

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

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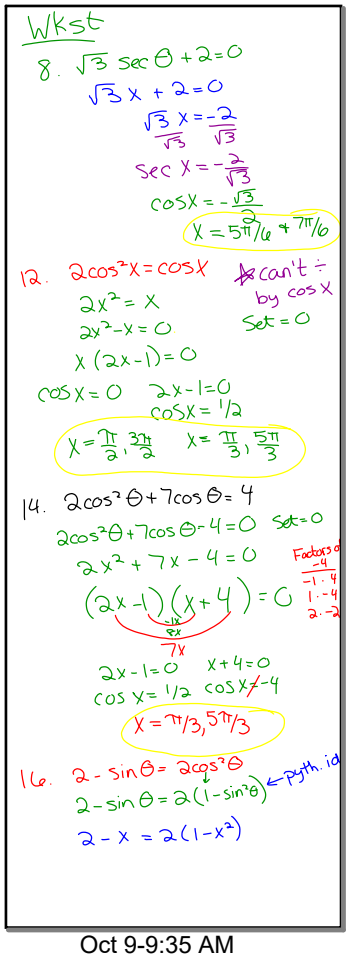
Wkst
8. $\sqrt{3}\sec\theta + 2 = 0$
$\sqrt{3}x + 2 = 0$
$\frac{\sqrt{3}}{\sqrt{3}}x = \frac{-2}{\sqrt{3}}$
$\sec x = -\frac{2}{\sqrt{3}}$
$\cos x = -\frac{\sqrt{3}}{2}$
$x = 5\pi/6 + 7\pi/6$
12. $2\cos^2 x = \cos x$
can't ÷ by cos x
$2x^2 = x$
Set = 0
$2x^2 - x = 0$
$x(2x-1) = 0$
$\cos x = 0$
$2x - 1 = 0$
$\cos x = 1/2$
$x = \frac{\pi}{2}, \frac{3\pi}{2}$
$x = \frac{\pi}{3}, \frac{5\pi}{3}$
14. $2\cos^2\theta + 7\cos\theta = 4$
$2\cos^2\theta + 7\cos\theta - 4 = 0$ Set = 0
$2x^2 + 7x - 4 = 0$
Factors of -4
$-1 \cdot 4$
$1 \cdot -4$
$2 \cdot -2$
$(2x-1)(x+4) = 0$
$-8x$
$-7x$
$2x - 1 = 0$
$x + 4 = 0$
$\cos x = 1/2$
$\cos x \neq -4$
$x = \pi/3, 5\pi/3$
16. $2 - \sin\theta = 2\cos^2\theta$
Pyth. id
$2 - \sin\theta = 2(1 - \sin^2\theta)$
$2 - x = 2(1 - x^2)$
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