Trig 7.5

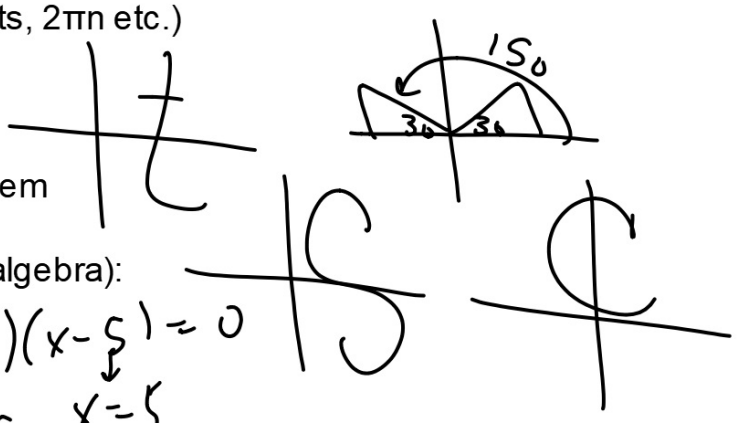
Solve trig equations
Solve trig inequalities

identity $2x+4=2(x+2)$

equation $2x+4=16$

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

- ~~principal~~ values (depends on which function is used...) $30°$
- ~~all~~ real values (look in all quadrants, $2\pi n$ etc.)
- ~~default~~: radians
- ~~degrees~~ only if specified in problem



All the properties of equation solving (algebra):

- factoring x^2-25 $(x+5)(x-5)=0$
- zero product property
- etc.

$x=-5$ $x=5$

whiteboards

Solve $x^2 + 6x = 0$

$x(x+6) = 0$

$x = 0 \quad x = -6$

Principal values
(Which quadrants should I look in?)
Depends on which function it is.

$0 < x < 360$

Solve each equation for ~~principal values~~ of x. Express solutions in degrees.

5. $2 \sin x + 1 = 0$

$2\sin x + 1 = 0$

$-1 \quad -1$

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

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

$x = 330°$

6. $2 \cos x - \sqrt{3} = 0$

$2\cos x - \sqrt{3} = 0$

$+\sqrt{3} \quad +\sqrt{3}$

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

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

$x = 30°$

$x =$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

$\sqrt{\sin^2 x} = \sqrt{\frac{1}{4}}$

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

$\frac{1}{2} \quad -\frac{1}{2}$

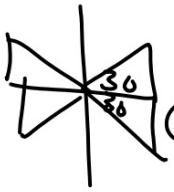
$30° \quad 330°$

1. express using only one trig function (parking lot)
2. factor, maybe QF to solve

Solve each equation for $0° \le x < 360°$.

7) $\sin x \cot x = \frac{\sqrt{3}}{2}$

$\sin x \cdot \frac{\cos x}{\sin x} = \frac{\sqrt{3}}{2}$



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

$30°, 330°$

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

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

$+2\sin^2 x \quad +2\sin^2 x$

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

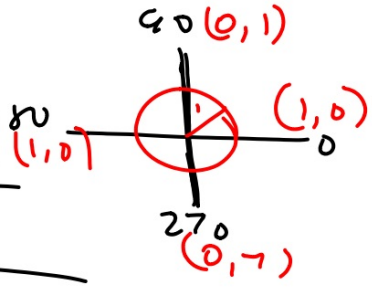
$\frac{3}{3} = \frac{3\sin^2 x}{3}$

$\sqrt{\sin^2 x} = \sqrt{1}$

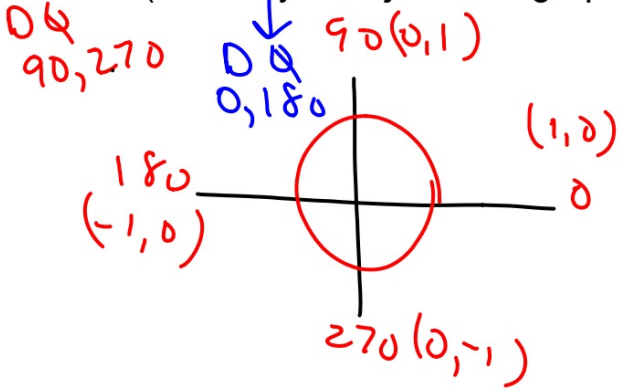
$\sin x = \pm 1$

$x = 1 \quad x = -1$

$\frac{0}{h} \quad 90, 270$

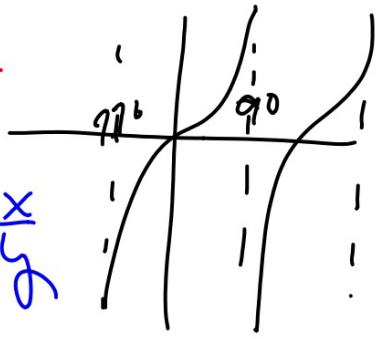


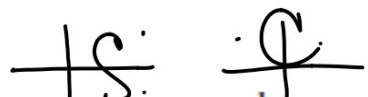
Tan & cot are sometimes undefined...
(divide by 0: unjt circle...graphs...)



$\tan x = \frac{opp}{adj} \quad \frac{y}{x}$

$\cot x = \frac{adj}{opp} = \frac{x}{y}$





1 Solve $\sin x \cos x - \frac{1}{2}\cos x = 0$ for principal values of x. Express solutions in degrees.

x=

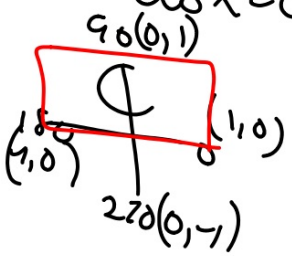
$\cos x\left(\sin x - \frac{1}{2}\right) = 0$

$\cos x = 0$ → $90°$

$\sin x - \frac{1}{2} = 0$

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

$30°$



Express using the same trig function for all... factor/solve for x=

2 Solve $\cos^2 x - \cos x + 1 = \sin^2 x$ for $0 \le x < 2\pi$.

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

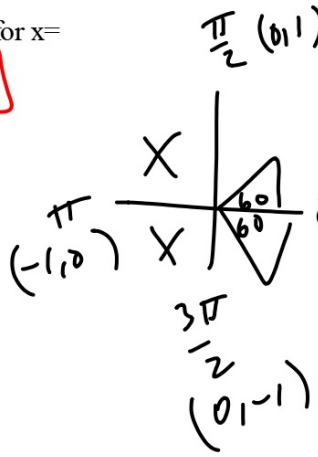
$+\cos^2 x \quad -1 \quad -1 + \cos^2 x$

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

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

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

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



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

$\frac{\pi}{3}, \frac{5\pi}{3}$

$2\pi - \frac{\pi}{3}$

$\frac{6\pi}{3} - \frac{\pi}{3}$

Same trig function

Solve each equation for all real values of x.

12. $\tan^2 x + 2\tan x + 1 = 0$

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

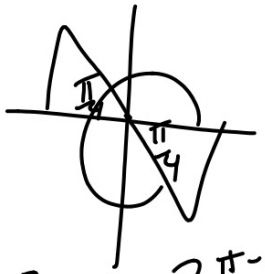
$a^2 + 2a + 1 = 0$

$(a+1)^2 = 0$

$\sqrt{(\tan x + 1)^2} = \sqrt{0}$

$\tan x + 1 = \pm 0$

$\tan x = -1$



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

$\frac{7\pi}{4} + 2\pi n$ $\quad \frac{8\pi}{4} - \frac{\pi}{4}$

n = integer

Are there ever any values where tan is undefined? (might need to DQ an answer)

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Maybe x-factor...factor by grouping, QF etc.

Solve each equation for $0 \le x < 2\pi$.

9. $3 \tan^2 x - 1 = 0$

10. $2 \sin^2 x = 5 \sin x + 3$

Are there ever any values where tan is undefined?