Solving Trig Equations

May 23

Q2 | Q1

recall: sin+, csc+ | all +

tan+, cot+ | cos, sec +

Q3 | Q4

note: $\cos^2 x = (\cos x)^2$

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

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examples: Solve over the interval $0 \le x < 2\pi$

ex. 1 $4\cos^2 x - 3 = 0$

$4y^2 - 3 = 0$

$4\cos^2 x = 3$

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

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

$x = 30^\circ, 330^\circ, 150^\circ, 210^\circ$ (Q1, Q4, Q2, Q3)

$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

ex. 2 $\tan^2 x - 2\tan x + 1 = 0$

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

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

$\tan x - 1 = 0$

$\tan x = 1$

Q1, Q3

$45^\circ, 225^\circ$

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

ex. 3 $\sqrt{\cot^2 x} = \sqrt{\frac{1}{3}}$

$\cot x = \pm\frac{1}{\sqrt{3}}$

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

Q1 (+) Q2 (−) Q3 (+) Q4 (−)

$60^\circ, 120^\circ, 240^\circ, 300^\circ$

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

ex. 4 $\sin^2 x = 2\sin x$

$y^2 - 2y = 0$

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

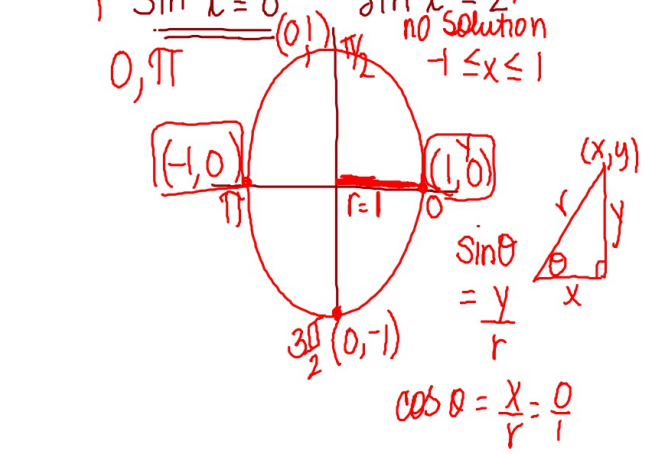
$\sin x(\sin x - 2) = 0$

$\sin x = 0$ / 1 ; $\sin x = 2$

no solution

$-1 \le x \le 1$

$0, \pi$



$\sin\theta = \frac{y}{r}$

$\cos\theta = \frac{x}{r} = \frac{0}{1}$