Algebraic rule: $\sqrt{\cos^2 x} = \cos x$, etc.

Section 5.3; p 362

Warm-up: use algebra to isolate the trig "function" on one side of the equation.

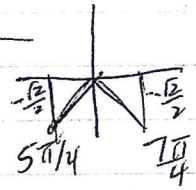
1) $\sin x + \sqrt{2} = -\sin x$

$+\sin x \quad +\sin x$

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

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

$\frac{5\pi}{4} + 2\pi n \quad \frac{7\pi}{4} + 2\pi n$ ← every rotation gets another solution



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

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

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

$\frac{\pi}{4} + 2\pi n, \frac{3\pi}{4} + 2\pi n$

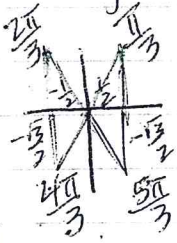
quadratic type

3) $4\sin^2 x - 3 = 0$

$4\sin^2 x = 3$

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

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



general solution → $\frac{\pi}{3} + \pi n \quad \frac{2\pi}{3} + \pi n$

4) $\sin^2 x = 2\sin x$

Hint: Is it quadratic? Then Set=0 and factor.

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

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

$\sin x = 0 \quad \sin x = 2$ extraneous

$x = \pi + n\pi$

Once you have isolated the trig function(s), then think ...

What does this mean? x is an angle measured in radians.

So I want to know the radians (#1) where $\sin\theta = -\frac{\sqrt{2}}{2}$

Two approaches: graphical / unit circle.

unit circle gives you exact answer — see sketches above

graphing gives your understanding; you can check your answer with trace. graph one side of equation in Y_1, constant in Y_2. Find intersection

OR: What are the solutions over the interval 0 to 2π.

Pay attention to the question.

Solve or general solution will show all solutions (like #3 above).

On the interval 0 to 2π is just the answers on one rotation of the unit circle.

Solve $\cos^2 x = 1$

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

$\cos x = ???$ IMPORTANT!!

± 1

What if you have 2 different functions?

Use identities!

$\sec^2 x - 2\tan x = 4$

$1 + \tan^2 x - 2\tan x = 4$

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

$(\tan x - 3)(\tan x + 1) = 0$

$\tan x = 3 \quad \tan x = -1$

Woops! requires inverse

$2\sec^2 x + \tan^2 x - 3 = 0$

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

$2 + 2\tan^2 x + \tan^2 x - 3 = 0$

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

$3\tan^2 x = 1$

$\tan^2 x = \frac{1}{3}$

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

$5\pi/6$ $\pi/6$ $7\pi/6$ $11\pi/6$

Use identity

$\sec^2 x = 1 + \tan^2 x$

$2\sec^2 x + \tan^2 x - 3 = 0$

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

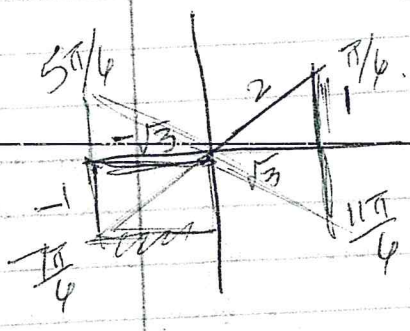
$2 + 2\tan^2 x + \tan^2 x - 3 = 0$

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

$3\tan^2 x = 1$

$\sqrt{\tan^2 x} = \sqrt{\frac{1}{3}}$

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



$\frac{\pi}{6} + n\pi$

$\frac{5\pi}{6} + n\pi$

answer every 180° to tahn