Section 7.5: Solving Trig Equations

Monday, March 02, 2015
1:12 PM

solve

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

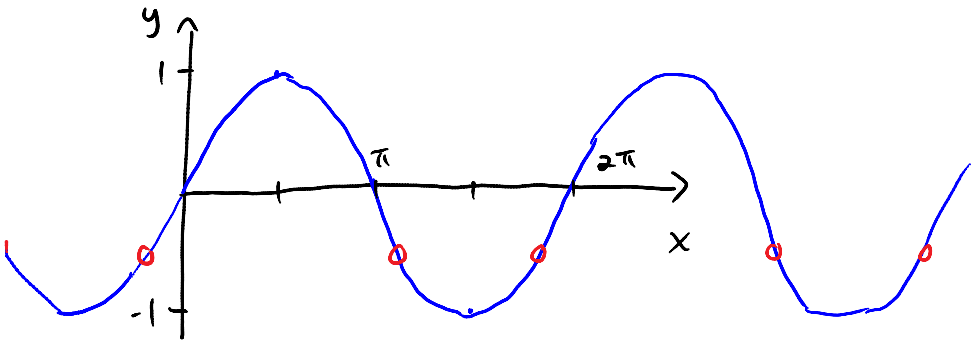
$$2\sin x = -1$$

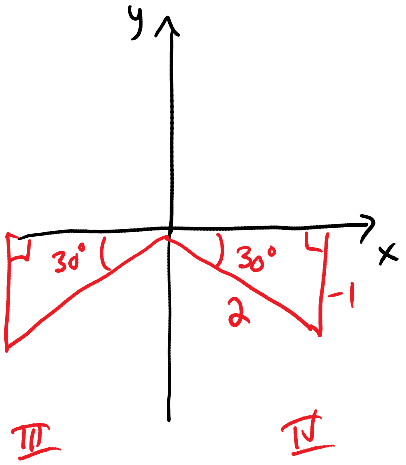
$$\sin x = -\frac{1}{2}$$

note: $\sin x = -\frac{1}{2}$ ⇐ no restrictions on x

is not the same as

$x = \sin^{-1}\left(-\frac{1}{2}\right)$ ⇐ restricted to $[-90°, 90°]$





$\sin x$ is $-$ in QIII & QIV

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

so $x = \begin{cases} -30° & \text{or coterminal} \\ 210° & \text{or coterminal} \end{cases}$

$\left\{ 210° \text{ or coterminal} \right.$

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solve $2\sin x + 1 = 0$ in $[0, 360°)$

exactly as before except for last step

$x = 210°, 330°$ $\qquad x = \begin{cases} 210° \\ 330° \end{cases}$

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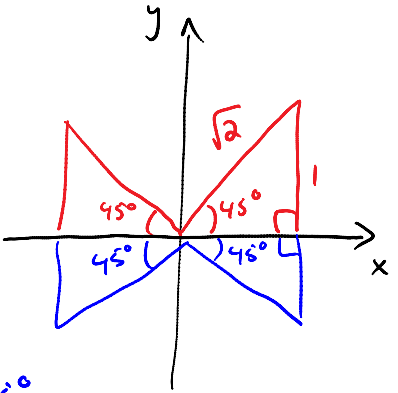
solve: $2\sin^2 x = 1$ in $[0, 360°)$

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

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

$= \pm\frac{1}{\sqrt{2}}$

$= +\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$



$x = 45°, 135°, 225°, 315°$

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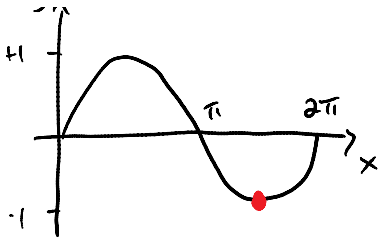
solve $\sin x = -1$ in $[0, 360°)$ or $[0, 2\pi)$

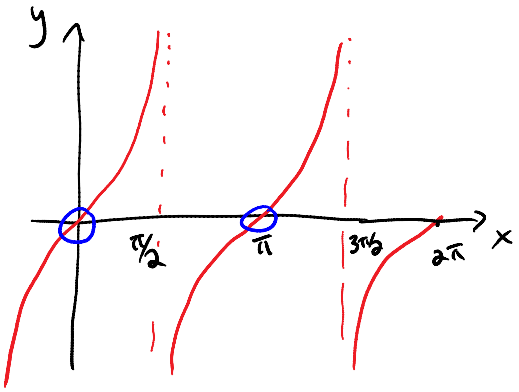
lies on one of the axes



it's on one of the axes

$x = \frac{3\pi}{2}$ or $x = 270°$

Solve $\tan x = 0$ in $[0, 360°)$ or $[0, 2\pi)$



$x = 0, 180°$ or $x = 0, \pi$

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how about

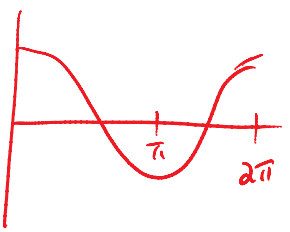
$\tan x \cos x + \tan x = 0$ in $[0, 360°)$

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

$\tan x = 0$ or $\cos x + 1 = 0$

we just did this one!

$x = 0, 180°$



$\cos x = -1$

$x = 180°$

$x = 0, 180°$

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solve

$\tan x \sin x + \tan x = 0 \quad \text{in } [0, 360°)$

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

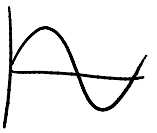
$\tan x = 0$

$x = 0, 180°$

$\sin x + 1 = 0$

$\sin x = -1$

$x = 270°$



$x = 0, 180°, \cancel{270°}$ extraneous

$\tan 270°$ is undefined

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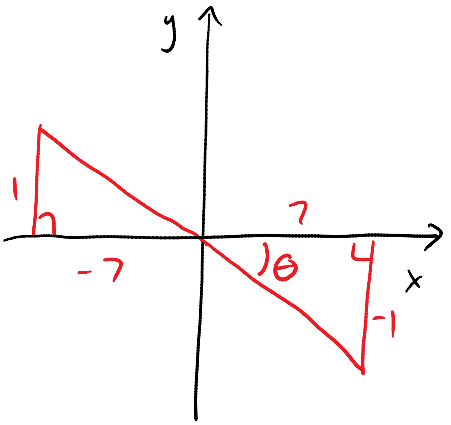
solve, rounding your answer to 2 decimal places

$7 \tan x + 1 = 0 \quad \text{in } [0, 360°)$

$\tan x = -\frac{1}{7}$

y ↑



$\tan^{-1}\left(\frac{-1}{7}\right) = -8.13°$

$x = 351.87°, 171.87°$