Section 7.5: cont'd

Tuesday, March 03, 2015
11:30 AM

solve $\sin^2 x + 2\sin x = 3$ in $[0, 360°)$ or $[0, 2\pi)$

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

let $y = \sin x$

$y^2 + 2y - 3 = 0$

$(y + 3)(y - 1) = 0$

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

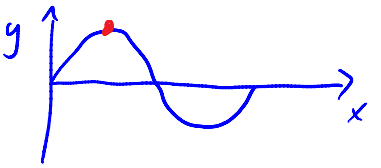
$\sin x + 3 = 0$

$\sin x = -3$

range problem/ no soln's/ ϕ

$\sin x - 1 = 0$

$\sin x = 1$



$x = \pi/2$ or $90°$

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solve:

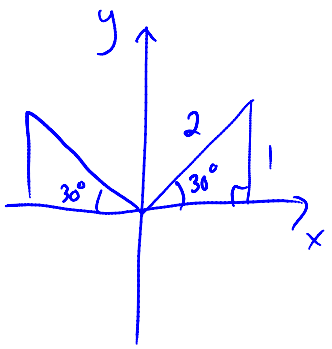
$2\sin t \cos t + 2\sin t - \cos t - 1 = 0$ in $[0, 360°)$ or $[0, 2\pi)$

$2\sin t(\cos t + 1) - 1(\cos t + 1) = 0$

$(2\sin t - 1)(\cos t + 1) = 0$

$2\sin t - 1 = 0$ ↙

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

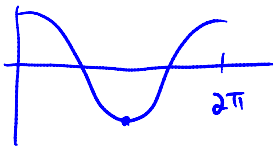


$t = 30°, 150°$

$= \pi/6, 5\pi/6$

$\cos t + 1 = 0$ ↘

$\cos t = -1$



$t = \pi$ or $180°$

$\{30°, 150°, 180°\}$

$\{\pi/6, 5\pi/6, \pi\}$

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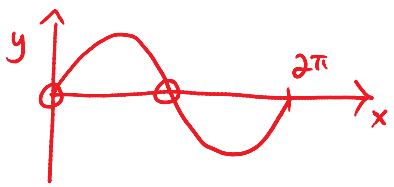
solve $\sin 2x = 0$ in $[0, 360°)$ or $[0, 2\pi)$

method #1:

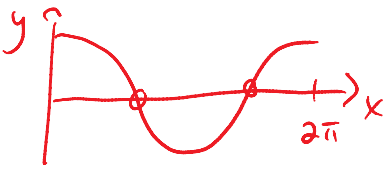
$2\sin x \cos x = 0$

↙ ↘

$\sin x = 0$ or $\cos x = 0$



$x = 0, \pi$



$x = \pi/2, 3\pi/2$

$x = 0, \pi$
$= 0, 180°$

$x = \pi/2, 3\pi/2$
$= 90°, 270°$

$x = 0, 90°, 180°, 270°$
$= 0, \pi/2, \pi, 3\pi/2$

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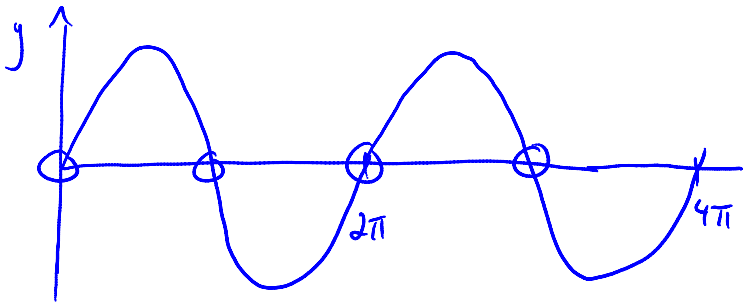
method #2: let $\theta = 2x$, x in $[0, 360°)$

$\sin\theta = 0$ θ in $[0, \underline{720°})$ $\underline{4\pi}$



$\theta = 0, 180°, 360°, 540°$

and $x = \frac{\theta}{2} = 0, 90°, 180°, 270°$ as before

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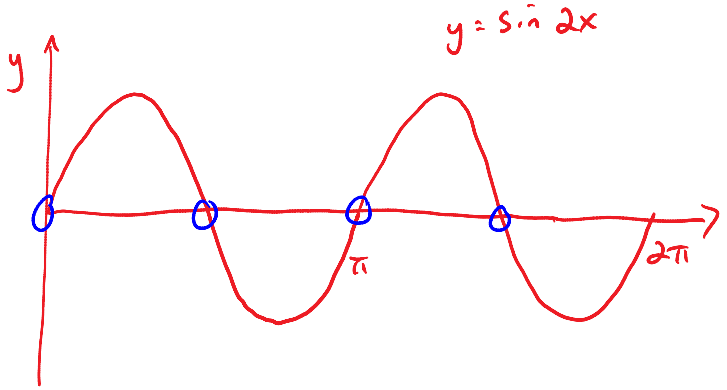
method #3:



so $x = 0, \pi/2, \pi, 3\pi/2$

$= 0, 90°, 180°, 270°$

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for kicks:

solve $e^{\sin x} = 1$ in $[0, 360°)$ or $[0, 2\pi)$

$\ln e^{\sin x} = \ln 1$

$\sin x = 0$

$x = 0, 180°$