

Pre-Calculus 12

Solving Trigonometric Equations Graphically

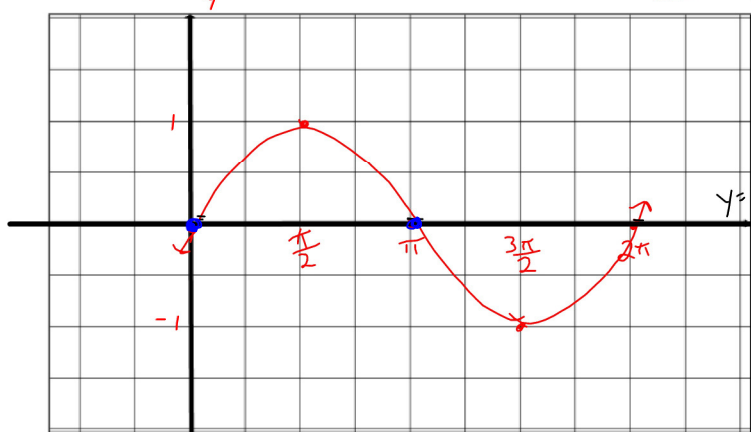
The solutions to a trig equation are the same as the x-intercepts or zeros of the corresponding trig function.

Trig Function $y = 3 \sin 2(x - \pi) + 3$ has zero(s)

Trig Equation $3 \sin 2(x - \pi) + 3 = 0$ has roots

Ex. 1) Graph $y = \sin x$ and determine:

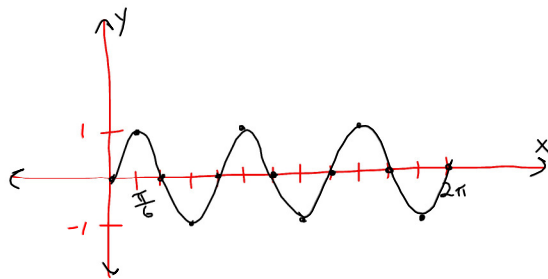
a) the roots of the equation $\sin x = 0$ over the domain $0 \leq x < 2\pi$



$x = 0, \pi, 2\pi$
not in interval

b) general solution for $\sin x = 0$
(same as over the domain $x \in \mathbb{R}$)
 $x = k\pi, k \in \mathbb{Z}$

c) solution to $\sin 3x = 0$ over the domain $0 \leq x < 2\pi$

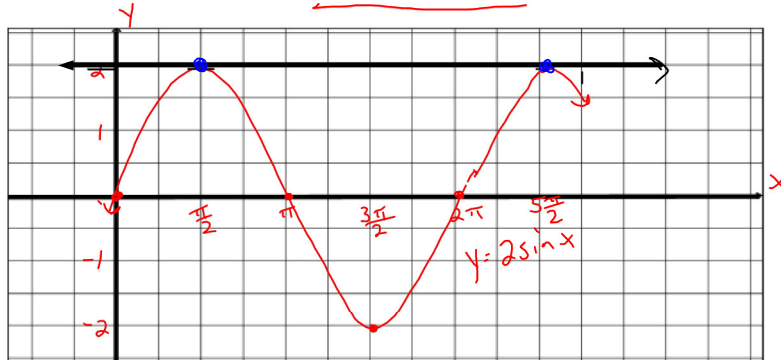


period = $\frac{2\pi}{3}$
 $\div 4$
 $\frac{2\pi}{12}$
 $\frac{\pi}{6}$

$$x = 0, \frac{2\pi}{6}, \frac{4\pi}{6}, \frac{6\pi}{6}, \frac{8\pi}{6}, \frac{10\pi}{6}, \frac{12\pi}{6}$$

$$x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$$

Ex. 2) Solve $2 \sin x = 2$ for all possible values of x . $x \in \mathbb{R}$



Graph $y = 2 \sin x$

Graph $y = 2$

Find the intersection
(x-values only)

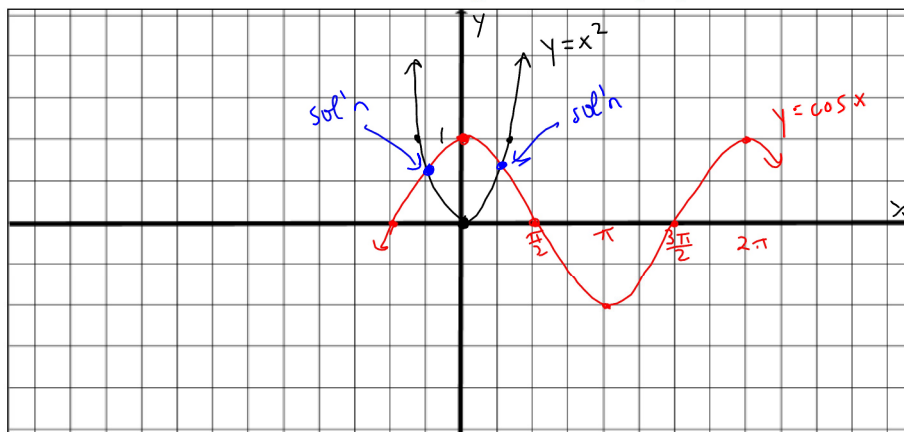
$x = \frac{\pi}{2}, \frac{5\pi}{2} \dots$ gen'l sol'n $x = \frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}$

Ex. 3) Explain why the equation $\cos x = 3$ has no solution.

The range of the graph of $y = \cos x$ is $[-1, 1]$, therefore it would not intersect with the graph of $y = 3$

Indicate the solutions of

Ex. 4) ~~Solve~~ $\cos x = x^2, x \in \mathbb{R}$. on a clearly labelled graph.



$y = \cos x$
 $y = x^2$

Sol'n's are the x-values of the indicated points of intersection.

Assignment: Handout "Solving Trig Equations by Graphing"

2a) use a scale of $\frac{\pi}{6}$

2b) indicate the sol'n's