

WARMUP

On Desmos, ^① graph

$$y = \sin x$$

$$y = \frac{1}{2}$$

For what x -values between 0 and 2π do they meet?

How many times do they meet between 0 and 2π

② Graph

$$y = \sin(2x)$$

$$y = \frac{1}{2}$$

For what x -values between 0 and 2π do they meet?

How many times?

③ How many times would they meet if you found $y = \sin(3x)$ and $y = \frac{1}{2}$

Section 6.7 Solving Trig Equations

An equation such as $\sin \theta = \frac{1}{2}$ is asking for what angles does the $\sin \theta$ equal $\frac{1}{2}$.

ex: Solve the equation $\sin \theta = \frac{1}{2}$ for $\underbrace{0 \leq \theta < 2\pi}_{\text{radians}}$

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$$

If we were asked to give general solution (or solve for all real numbers)

$$\theta = \frac{\pi}{6} + 2\pi k \quad (k \text{ is any integer})$$

$$\theta = \frac{5\pi}{6} + 2\pi k$$

ex: Solve $-2\cos\theta = \sqrt{3}$ Give general solutions.

$$\cos\theta = -\frac{\sqrt{3}}{2}$$

$$\theta = \frac{5\pi}{6} + 2\pi k$$

$$\theta = \frac{7\pi}{6} + 2\pi k$$

ex: Solve $\tan\theta = -1$. Give general solutions.

(For tan use πk)

$$\theta = \frac{3\pi}{4} + \pi k$$

$$\theta = \frac{7\pi}{4} + \pi k$$

} Stating both answers is redundant
since $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ are π apart

So answer is $\theta = \frac{3\pi}{4} + \pi k$

ex: $\cos(2\theta) = \frac{1}{2}$ Solve on $0 \leq \theta < 2\pi$ and general

$$\frac{1}{2}(2\theta) = \left(\frac{\pi}{3} + 2\pi k\right) \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6} + \pi k$$

$$2\theta = \frac{5\pi}{3} + 2\pi k \Rightarrow \theta = \frac{5\pi}{6} + \pi k$$

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

Assignment

For 1-5, find general formula
 $+2\pi k$
for \sin, \cos, \sec, \csc

$+\pi k$
for \tan, \cot

$$1) \tan \theta = \frac{\sqrt{3}}{3}$$

$$2) 3 \sin \theta + 3 = 0$$

$$3) 2 \sec \theta = 4$$

$$4) 2 \sin \theta + 1 = 0$$

$$5) \cot \theta = \sqrt{3}$$

In 6-9 solve on $0 \leq \theta < 2\pi$

$$6) 2 \sin \theta + 3 = 2$$

$$7) \sin(2\theta) = \frac{\sqrt{3}}{2}$$

$$8) \cos^2 \theta = \frac{1}{4}$$

$$\cos \theta = \pm \sqrt{\frac{1}{4}} \leftarrow$$

$$\cos \theta = \pm \frac{1}{2}$$

$$9) \tan \theta = \sqrt{3}$$