

WARMUP

Fill in the blanks for the Fibonacci sequence:

-8, 5, -3, 2, -1, 1, 0, 1, 1, 2, 3, 5, 8, 13, 21, ...

Section 6.7

Solving Trig Equations

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

ex: Solve $\sin\theta = \frac{1}{2}$ 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 $\frac{-2\cos\theta}{-2} = \frac{\sqrt{3}}{-2}$. 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

Period of
tangent is π
For tan and cot
add 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

$$\frac{7\pi}{4} - \frac{3\pi}{4} = \frac{4\pi}{4} = \pi$$

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

$$\cos(\omega x - \phi)$$

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

$$\text{Period} = \frac{2\pi}{\omega} = \frac{2\pi}{2} = \pi$$

$$\frac{1}{2} \cdot 2\theta = \frac{\pi}{3} \cdot \frac{1}{2} = \frac{\pi}{6}$$

$$\frac{1}{2} \cdot 2\theta = \frac{5\pi}{3} \cdot \frac{1}{2} = \frac{5\pi}{6}$$

$$\left(\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \right)$$

add period to both answers

$$\frac{\pi}{6} + \pi = \frac{\pi}{6} + \frac{6\pi}{6} = \frac{7\pi}{6}$$

$$\frac{5\pi}{6} + \pi = \frac{5\pi}{6} + \frac{6\pi}{6} = \frac{11\pi}{6}$$

Assignment

For 1-4 find general formula

1) $\tan \theta = \frac{\sqrt{3}}{3} \quad (+\pi k)$

2) $3 \sin \theta + 3 = 0$
3) $2 \sec \theta = 4$
4) $2 \sin \theta + 1 = 0$ } $(+2\pi k)$

In 5-8 Solve on
 $0 \leq \theta < 2\pi$

5) $2 \cos \theta + 3 = 2$

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

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

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

5) $2 \cos \theta + 3 = 2$
 $2 \cos \theta = -1$
 $\cos \theta = -\frac{1}{2}$

$$\theta = \frac{2\pi}{3}, \frac{4\pi}{3}$$

7) $\cos^2 \theta = \frac{1}{4}$
 $\cos \theta = \pm \sqrt{\frac{1}{4}} = \pm \frac{1}{2}$

$$6) \sin(2\theta) = \frac{\sqrt{3}}{2} \quad \text{Period} = \frac{2\pi}{2} = \pi$$

$$\frac{1}{2} \cdot 2\theta = \frac{\pi}{3} \cdot \frac{1}{2} = \frac{\pi}{6} + \pi = \frac{7\pi}{6}$$

$$\frac{1}{2} \cdot 2\theta = \frac{2\pi}{3} \cdot \frac{1}{2} = \frac{\pi}{3} + \pi = \frac{4\pi}{3}$$

$$\frac{1}{6} + \frac{6}{6} = \frac{7}{6}$$

$$\frac{1}{3} + \frac{3}{3} = \frac{4}{3}$$

$$\frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$$