Tuesday, February 19, 2019
6:21 PM

KEY

5.3 D – Solving Trigonometric Equations

Homework:
- Section 5.3D
- Quiz 5.1 – 5.3 Monday

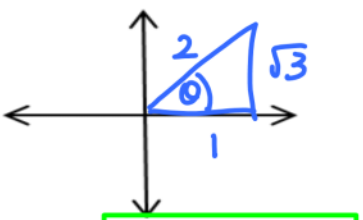
Do Now:

Solve $2\cos\theta - 1 = 0$ over $[0, 2\pi)$

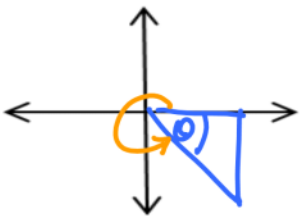
$2\cos\theta = 1$

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

S | A
T | C



$\theta = \frac{\pi}{3}$



$\theta = \frac{5\pi}{3}$

Homework Questions??

Solving Multiple Angle Trig Equations

Solve: $2\cos 2\theta - 1 = 0$

$2\cos 2\theta = 1$

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

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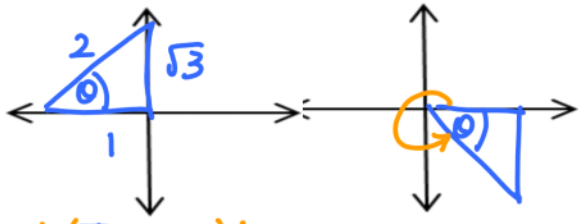


$\frac{1}{2}(2\theta) = \left(\frac{\pi}{3} + 2\pi n\right)\frac{1}{2}$

$\theta = \frac{\pi}{6} + \pi n$

$\frac{1}{2}(2\theta) = \left(\frac{5\pi}{3} + 2\pi n\right)\frac{1}{2}$

$\theta = \frac{5\pi}{6} + \pi n$

① Solve the equation for "2θ".

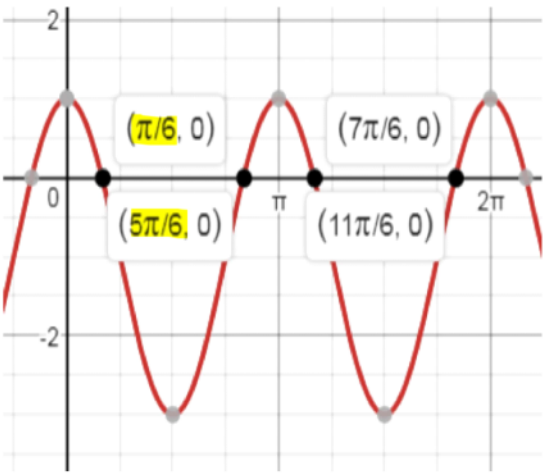
② Set the angle values found equal to "2θ" and solve for "θ"

What is the period of this function? $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

How does that connect to your solution? * ADD π (or $\frac{6\pi}{6}$) to get other solutions

We can check our solutions by graphing!

$2\cos(2x) - 1$



Find all solutions in the interval $[0,2\pi)$:

$$3\tan 3x + 3 = 0$$

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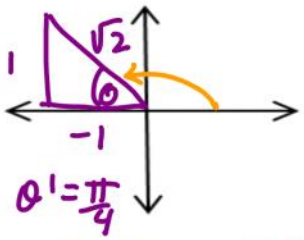
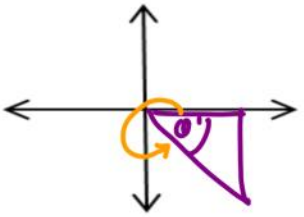
$\frac{3\tan 3x}{3} = \frac{-3}{3}$

$\tan 3x = -1$





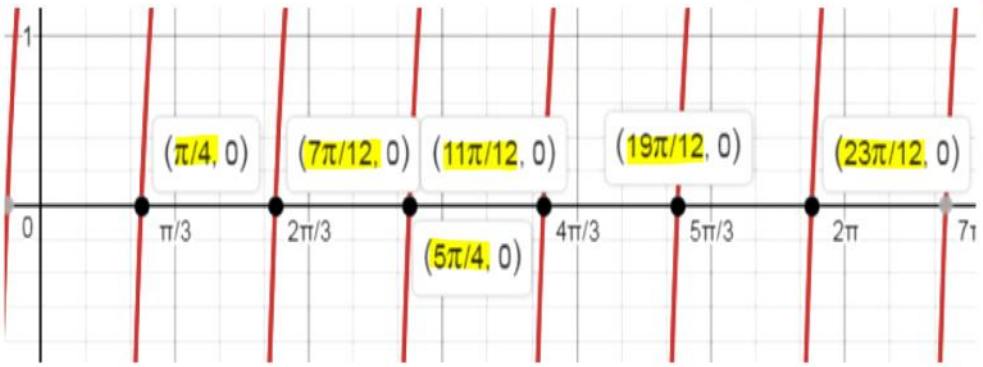
$\frac{1}{3}(3\theta) = (\frac{3\pi}{4} + \pi n)\frac{1}{3}$ $\frac{1}{3}(3\theta) = (\frac{7\pi}{4} + \pi n)\frac{1}{3}$

$\frac{3\pi}{12} =$ $\theta = \frac{\pi}{4} + \frac{\pi n}{3}$ $\theta = \frac{7\pi}{12} + \frac{\pi n}{3}$

What is the period of this function? $\frac{\pi}{b} = \frac{\pi}{3} \cdot \frac{4}{4}$

*ADD $\frac{4\pi}{12}$ to get other solutions

$\frac{11\pi}{12}, \frac{15\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

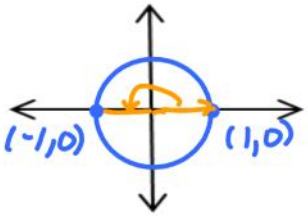


Find all solutions in the interval $[0,2\pi)$:

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

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

$\sin 2x = 0$



$\frac{1}{2}(2x) = (0 + 2\pi n)\frac{1}{2}$

$x = 0 + \pi n$

$x = 0, \pi$

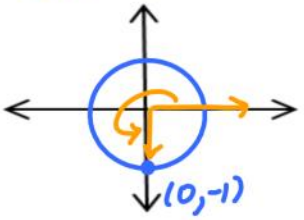
$\frac{1}{2}(2x) = (\pi + 2\pi n)\frac{1}{2}$

$x = \pi/2 + \pi n$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$

$\sin 2x + 1 = 0$

$\sin 2x = -1$



$\frac{1}{2}(2x) = (\frac{3\pi}{2} + 2\pi n)\frac{1}{2}$

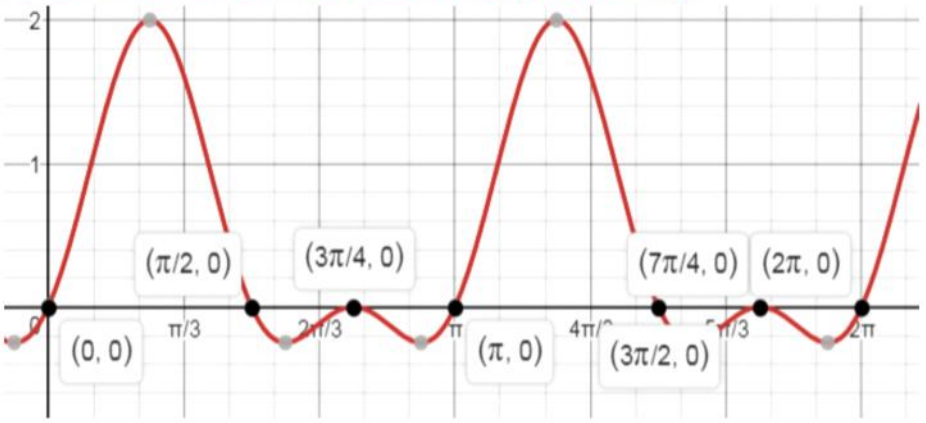
$x = 3\pi/4 + \pi n$

$x = \frac{3\pi}{4}, \frac{7\pi}{4}$

What is the period of this function? $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

* TO GET ALL SOLUTIONS ADD MULTIPLES OF π.

We can check our solutions by graphing!



Solve the equation:

$$\sin\left(\frac{x}{2}\right) = -\frac{\sqrt{3}}{2}$$

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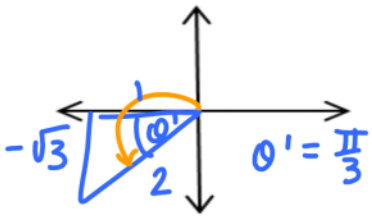
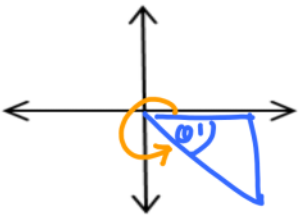




$2\left(\frac{1}{2}x\right) = \left(\frac{4\pi}{3} + 2\pi n\right)2$

$x = \frac{8\pi}{3} + 4\pi n$

$2\left(\frac{1}{2}x\right) = \left(\frac{5\pi}{3} + 2\pi n\right)2$

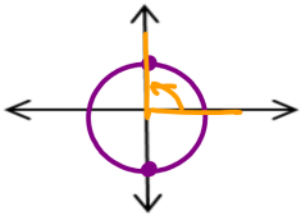
$x = \frac{10\pi}{3} + 4\pi n$

What is the period of this function? $\frac{2\pi}{b} = \frac{2\pi}{\frac{1}{2}} = 4\pi$

Solve the equation:

$$\cos 2y\left(\cos y - 1\right) = 0$$

$\cos 2y = 0$



$\frac{1}{2}(2y) = \left(\frac{\pi}{2} + 2\pi n\right)\frac{1}{2}$

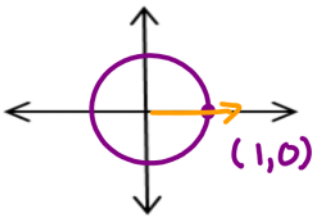
$y = \frac{\pi}{4} + \pi n$

$\frac{1}{2}(2y) = \left(\frac{3\pi}{2} + 2\pi n\right)\frac{1}{2}$

$y = \frac{3\pi}{4} + \pi n$

$\cos y - 1 = 0$

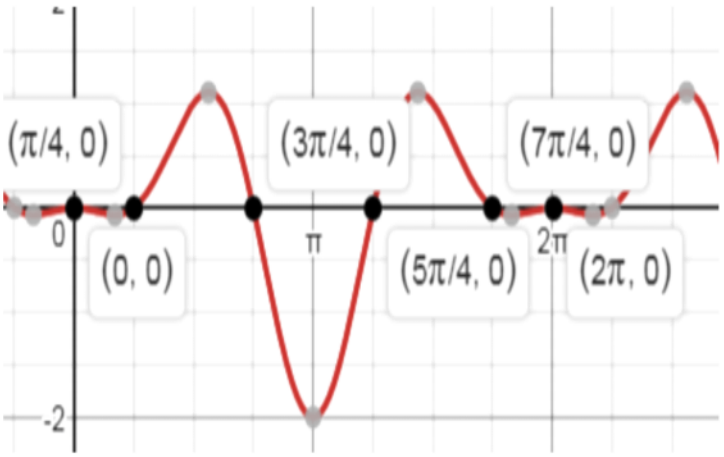
$\cos y = 1$



$y = 0 + 2\pi n$

* period $= \frac{2\pi}{b} = 2\pi$

* period $= \frac{2\pi}{b} = \frac{2\pi}{2} = \pi$



Find all solutions in the interval $[0,2\pi)$:

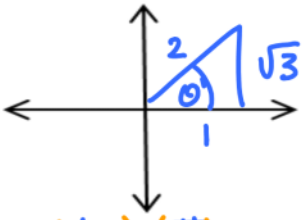
$$2\tan^2\left(\frac{x}{2}\right)-4=2$$

$2\tan^2\left(\frac{x}{2}\right)=6$

$\sqrt{\tan^2\left(\frac{x}{2}\right)}=\sqrt{3}$

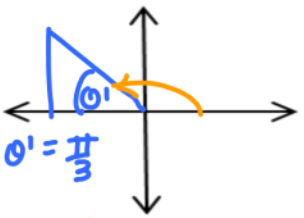
$\left|\tan\left(\frac{x}{2}\right)\right|=\sqrt{3}$

or $\tan\left(\frac{x}{2}\right)=\pm\sqrt{3}$



$2\left(\frac{1}{2}x\right)=\left(\frac{\pi}{3}\right)2$

$x=\frac{2\pi}{3}$

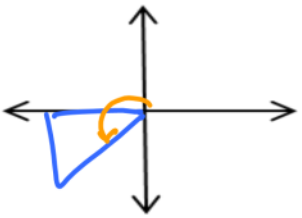


$2\left(\frac{1}{2}x\right)=\left(\frac{2\pi}{3}\right)2$

$x=\frac{4\pi}{3}$

* period $=\frac{\pi}{b}=\frac{\pi}{\frac{1}{2}}=2\pi$

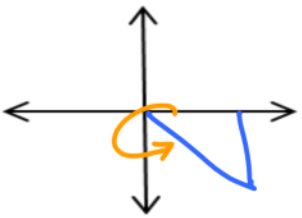
$2\pi\cdot\frac{3}{3}=\frac{6\pi}{3}$



$2\left(\frac{1}{2}x\right)=\left(\frac{4\pi}{3}\right)2$

$x=\frac{8\pi}{3}$

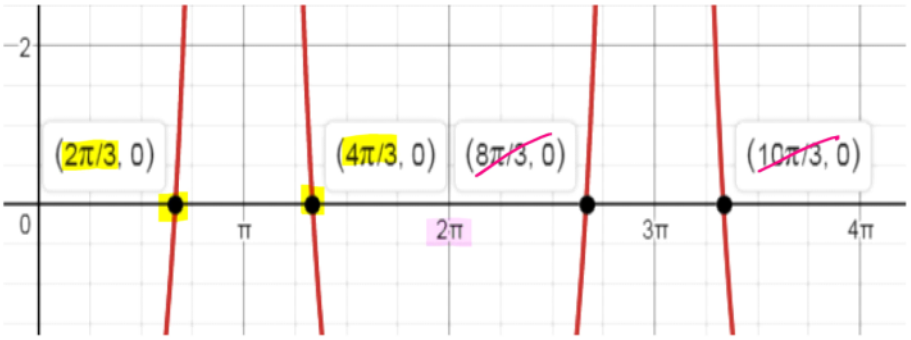
* beyond 2π



$2\left(\frac{1}{2}x\right)=\left(\frac{5\pi}{3}\right)2$

$x=\frac{10\pi}{3}$

* beyond 2π



Closure….

Using the graphing calculator……..

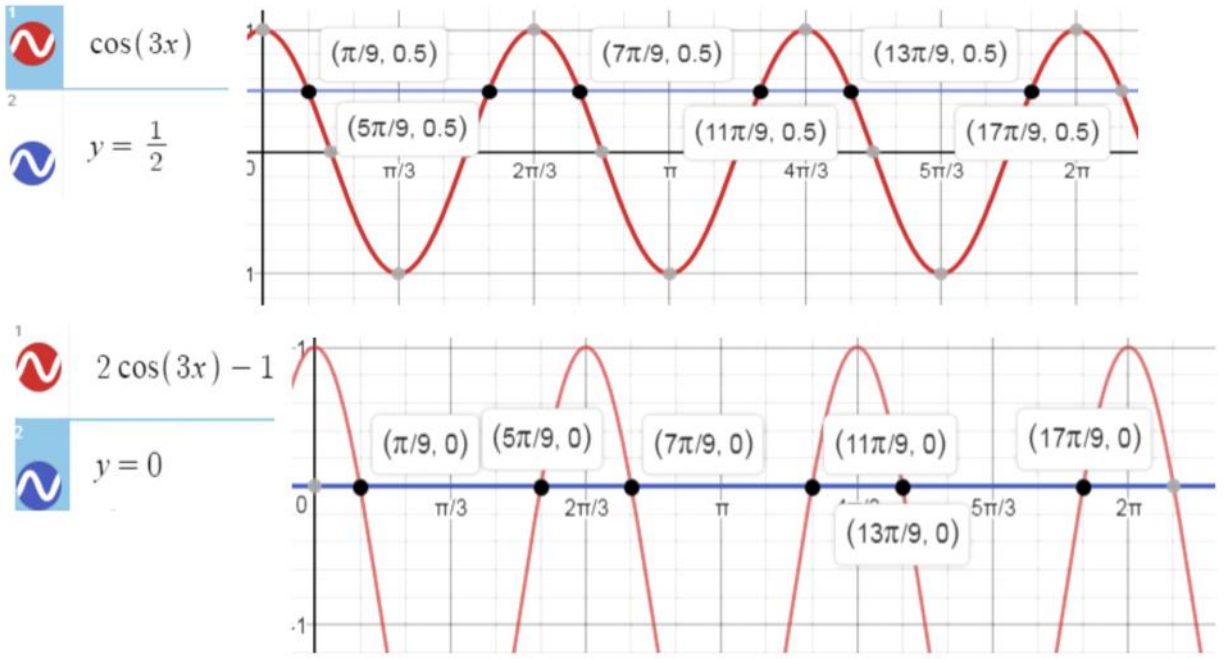
$$2\cos 3\theta - 1 = 0$$

$2\cos 3\theta = 1$

$\cos 3\theta = \frac{1}{2}$

What would the intersection *of* $y = \cos 3\theta$ *and* $y = \frac{1}{2}$ *represent*?

What would the intersection *of* $y = 2\cos 3\theta - 1$ *and* $y = 0$ *represent*?



They both represent all of the solutions to original equation.