# 5.5 HW Answers

Friday, December 8, 2017 2:08 PM

**2.** $\tan\frac{\pi}{3} = \sqrt{3}$

$\sqrt{3} = \sqrt{3}$ is true.

Thus, $\frac{\pi}{3}$ is a solution.

**4.** $\sin\frac{\pi}{3} = \frac{\sqrt{2}}{2}$

$\frac{\sqrt{3}}{2} = \frac{\sqrt{2}}{2}$ is false.

Thus, $\frac{\pi}{3}$ is not a solution.

**6.** $\cos\frac{4\pi}{3} = -\frac{1}{2}$

$-\frac{1}{2} = -\frac{1}{2}$ is true.

Thus, $\frac{4\pi}{3}$ is a solution.

**8.** $\cos\frac{2\pi}{3} = -\frac{1}{2}$

$-\frac{1}{2} = -\frac{1}{2}$ is true.

Thus, $\frac{2\pi}{3}$ is a solution.

**10.** $\cos\frac{\pi}{6} + 2 = \sqrt{3}\cdot\sin\frac{\pi}{6}$

$\frac{\sqrt{3}}{2} + 2 = \sqrt{3}\cdot\frac{1}{2}$

$\frac{4+\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ is false.

Thus, $\frac{\pi}{6}$ is not a solution.

**11.** $\sin x = \frac{\sqrt{3}}{2}$

Because $\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$, the solutions

for $\sin x = \frac{\sqrt{3}}{2}$ in $[0, 2\pi)$ are

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

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

Because the period of the sine function is $2\pi$, the solutions are given by

$x = \frac{\pi}{3} + 2n\pi$ or $x = \frac{2\pi}{3} + 2n\pi$

where $n$ is any integer.

**12.** $\cos x = \frac{\sqrt{3}}{2}$

Because $\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$, the solutions

for $\cos x = \frac{\sqrt{3}}{2}$ in $[0, 2\pi)$ are

$x = \frac{\pi}{6}$

$x = 2\pi - \frac{\pi}{6} = \frac{12\pi}{6} - \frac{\pi}{6} = \frac{11\pi}{6}.$

Because the period of the cosine function is $2\pi$, the solutions are given by

$x = \frac{\pi}{6} + 2n\pi$ or $x = \frac{11\pi}{6} + 2n\pi$

where $n$ is any integer.

**13.** $\tan x = 1$

Because $\tan\frac{\pi}{4} = 1$, the solution

for $\tan x = 1$ in $[0, \pi)$ is

$x = \frac{\pi}{4}.$ $\frac{5\pi}{4}$

**14.** $\tan x = \sqrt{3}$

Because $\tan\frac{\pi}{3} = \sqrt{3}$, the solution

for $\tan x = \sqrt{3}$ in $[0, \pi)$ is

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

for $\tan x = 1$ in $[0, \pi)$ is

$x = \frac{\pi}{4}$.  $\frac{5\pi}{4}$

Because the period of the tangent function is $\pi$, the solutions are given by

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

where $n$ is any integer.

for $\tan x = \sqrt{3}$ in $[0, \pi)$ is

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

Because the period of the tangent function is $\pi$, the solutions are given by

$x = \frac{\pi}{3} + n\pi$ where $n$ is any integer.

**15.** $\cos x = -\frac{1}{2}$

Because $\cos\frac{\pi}{3} = \frac{1}{2}$, the solutions

for $\cos x = -\frac{1}{2}$ in $[0, 2\pi)$ are

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

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

Because the period of the cosine function is $2\pi$, the solutions are given by

$$x = \frac{2\pi}{3} + 2n\pi \quad \text{or} \quad x = \frac{4\pi}{3} + 2n\pi$$

where $n$ is any integer.

**16.** $\sin x = -\frac{\sqrt{2}}{2}$

Because $\sin\frac{\pi}{4} = \frac{\sqrt{2}}{2}$, the solutions

for $\sin x = -\frac{\sqrt{2}}{2}$ in $[0, 2\pi)$ are

$$x = \pi + \frac{\pi}{4} = \frac{4\pi}{4} + \frac{\pi}{4} = \frac{5\pi}{4}$$

$$x = 2\pi - \frac{\pi}{4} = \frac{8\pi}{4} - \frac{\pi}{4} = \frac{7\pi}{4}.$$

Because the period of the sine function is $2\pi$, the solutions are given by

$$x = \frac{5\pi}{4} + 2n\pi \quad \text{or} \quad x = \frac{7\pi}{4} + 2n\pi$$

where $n$ is any integer.

**17.** $\tan x = 0$

Because $\tan 0 = 0$, the solution

for $\tan x = 0$ in $[0, \pi)$ is

$x = 0$.  $\pi$

Because the period of the tangent function is $\pi$, the solutions are given by

$x = 0 + n\pi = n\pi$

where $n$ is any integer.

**18.** $\sin x = 0$

Because $\sin 0 = 0$, the solutions

for $\sin x = 0$ in $[0, 2\pi)$ are

$x = 0$

$x = \pi + 0 = \pi$.

Because the period of the sine function is $2\pi$, the solutions are given by

$x = 0 + n\pi = n\pi$ or $x = \pi + 2n\pi$

where $n$ is any integer.

**19.** $2\cos x + \sqrt{3} = 0$

$$2\cos x = -\sqrt{3}$$

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

Because $\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$, the solutions

for $\cos x = -\frac{\sqrt{3}}{2}$ in $[0, 2\pi)$ are

$$x = \pi - \frac{\pi}{6} = \frac{6\pi}{6} - \frac{\pi}{6} = \frac{5\pi}{6}$$

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

Because the period of the cosine function is $2\pi$, the solutions are given by

$$x = \frac{5\pi}{6} + 2n\pi \quad \text{or} \quad x = \frac{7\pi}{6} + 2n\pi$$

where $n$ is any integer.

**20.** $2\sin x + \sqrt{3} = 0$

**21.** $4\sin\theta - 1 = 2\sin\theta$

**20.** $2\sin x+\sqrt{3}=0$

$$2\sin x=-\sqrt{3}$$

$$\sin x=-\frac{\sqrt{3}}{2}$$

Because $\sin\frac{\pi}{3}=\frac{\sqrt{3}}{2}$, the solutions for $\sin x=-\frac{\sqrt{3}}{2}$ in $[0,2\pi)$ are

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

$$x=2\pi-\frac{\pi}{3}=\frac{6\pi}{3}-\frac{\pi}{3}=\frac{5\pi}{3}.$$

Because the period of the sine function is $2\pi$, the solutions are given by

$$x=\frac{4\pi}{3}+2n\pi \quad \text{or} \quad x=\frac{5\pi}{3}+2n\pi$$

where $n$ is any integer.

**21.** $4\sin\theta-1=2\sin\theta$

$$4\sin\theta-2\sin\theta=1$$

$$2\sin\theta=1$$

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

Because $\sin\frac{\pi}{6}=\frac{1}{2}$, the solutions for $\sin\theta=\frac{1}{2}$ in $[0,2\pi)$ are

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

$$\theta=\pi-\frac{\pi}{6}=\frac{6\pi}{6}-\frac{\pi}{6}=\frac{5\pi}{6}.$$

Because the period of the sine function is $2\pi$, the solutions are given by

$$\theta=\frac{\pi}{6}+2n\pi \quad \text{or} \quad \theta=\frac{5\pi}{6}+2n\pi$$

where $n$ is any integer.

**22.** $5\sin\theta+1=3\sin\theta$

$$5\sin\theta-3\sin\theta=-1$$

$$2\sin\theta=-1$$

$$\sin\theta=-\frac{1}{2}$$

Because $\sin\frac{\pi}{6}=\frac{1}{2}$, the solutions for $\sin\theta=-\frac{1}{2}$ in $[0,2\pi)$ are

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

$$\theta=2\pi-\frac{\pi}{6}=\frac{12\pi}{6}-\frac{\pi}{6}=\frac{11\pi}{6}.$$

Because the period of the sine function is $2\pi$, the solutions are given by

$$\theta=\frac{7\pi}{6}+2n\pi \quad \text{or} \quad \theta=\frac{11\pi}{6}+2n\pi$$

where $n$ is any integer.

**23.** $3\sin\theta+5=-2\sin\theta$

$$3\sin\theta+2\sin\theta=-5$$

$$5\sin\theta=-5$$

$$\sin\theta=-1$$

Because $\sin\frac{\pi}{2}=1$, the solutions for $\sin\theta=-1$ in $[0,2\pi)$ are

$$\theta=\pi+\frac{\pi}{2}=\frac{2\pi}{2}+\frac{\pi}{2}=\frac{3\pi}{2}$$

$$\theta=2\pi-\frac{\pi}{2}=\frac{4\pi}{2}-\frac{\pi}{2}=\frac{3\pi}{2}.$$

Because the period of the sine function is $2\pi$, the solutions are given by

$$\theta=\frac{3\pi}{2}+2n\pi$$

where $n$ is any integer.

**24.** $7\cos\theta+9=-2\cos\theta$

$$7\cos\theta+2\cos\theta=-9$$

$$9\cos\theta=-9$$

$$\cos\theta=-1$$

Because $\cos\pi=-1$, the solution for $\cos\theta=-1$ in $[0,2\pi)$ is

$x=\pi.$

Because the period of the cosine function is $2\pi$, the solutions are given by

**86.** $\sin x=0.7392$

Be sure calculator is in radian mode and find the inverse sine of 0.7392. This gives the first quadrant reference angle.

$\theta=\sin^{-1}0.7392\approx 0.8319$

The sine is positive in quadrants I and II thus,

$x\approx 0.8319$ or $x\approx\pi-0.8319$

$x\approx 2.3097$

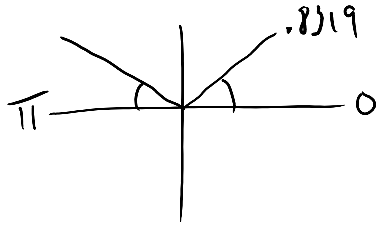
**87.** $\cos x=-\frac{2}{5}$

$x = \pi.$

Because the period of the cosine function is $2\pi$, the solutions are given by

$\theta = \pi + 2n\pi$

where $n$ is any integer.




**88.** $\cos x = -\frac{4}{7}$

Be sure calculator is in radian mode and find the inverse cosine of $+\frac{4}{7}$. This gives the first quadrant reference angle.

$\theta = \cos^{-1}\frac{4}{7} \approx 0.9626$

The cosine is negative in quadrants II and III thus,

$x \approx \pi - 0.9626$ or $x \approx \pi + 0.9626$

$x \approx 2.1790$ $x \approx 4.1041$

**89.** $\tan x = -3$

Be sure calculator is in radian mode and find the inverse tangent of +3. This gives the first quadrant reference angle.

$\theta = \tan^{-1} 3 \approx 1.2490$

The tangent is negative in quadrants II and IV thus,

$x \approx \pi - 1.2490$ or $x \approx 2\pi - 1.2490$

$x \approx 1.8925$ $x \approx 5.0341$

$x \approx 2.5097$

**87.** $\cos x = -\frac{2}{5}$

Be sure calculator is in radian mode and find the inverse cosine of $+\frac{2}{5}$. This gives the first quadrant reference angle.

$\theta = \cos^{-1}\frac{2}{5} \approx 1.1593$

The cosine is negative in quadrants II and III thus,

$x \approx \pi - 1.1593$ or $x \approx \pi + 1.1593$

$x \approx 1.9823$ $x \approx 4.3009$

**90.** $\tan x = -5$

Be sure calculator is in radian mode and find the inverse tangent of +5. This gives the first quadrant reference angle.

$\theta = \tan^{-1} 5 \approx 1.3734$

The tangent is negative in quadrants II and IV thus,

$x \approx \pi - 1.3734$ or $x \approx 2\pi - 1.3734$

$x \approx 1.7682$ $x \approx 4.9098$