Answer on Question #59342 – Math – Trigonometry

Question

1. Which value is a solution for the equation $tan\frac{x}{2} = 0$?

π

$\dfrac{3\pi}{2}$

$\dfrac{\pi}{2}$

2π

Solution

$tan\frac{x}{2} = \frac{sin\frac{x}{2}}{cos\frac{x}{2}}$, then $tan\frac{x}{2} = 0$ when the numerator is equal to zero. We know

$sin(\alpha) = 0$ when $\alpha = \pi \cdot n, n = 0, \pm 1, \pm 2, \dots$ Then we equate $\frac{x}{2}$ to $\pi \cdot n$ and solve

equation:

$\dfrac{x}{2} = \pi \cdot n$

$x = 2\pi \cdot n,$

hence 2π is a solution to the equation.

Answer: 2π.

Question

2. The value $\dfrac{5\pi}{4}$ is a solution for the equation $3\sqrt{2}\sec\theta + 7 = 1$?

True

False

Solution

Let's check if $\dfrac{5\pi}{4}$ is a solution. Substitute it into the equation:

$3\sqrt{2}\sec\theta + 7 = 1$

$3\sqrt{2}\sec\left(\dfrac{5\pi}{4}\right) + 7 = 1$

We know that $sec \propto = \dfrac{1}{cos\propto}$.

$3\sqrt{2}\,\dfrac{1}{cos\left(\frac{5\pi}{4}\right)} + 7 = 1,$

$cos\left(\dfrac{5\pi}{4}\right) = -\dfrac{\sqrt{2}}{2},$

$3\sqrt{2}\,\dfrac{1}{-\dfrac{\sqrt{2}}{2}} + 7 = 1,$

$$3\sqrt{2} \cdot \left(-\frac{2}{\sqrt{2}}\right) + 7 = 1,$$

$$-6 + 7 = 1,$$
which is true.
Answer: True.

Question

3. There is no solution to the equation $cscx = -1$.
False
True

Solution

Let's solve equation $cscx = -1$. We know $csc \propto = \frac{1}{\sin\propto}$, then we can rewrite the equation as
$$\frac{1}{\sin x} = -1,$$

$$\sin x = -1,$$
$$x = \frac{3\pi}{2} + 2\pi n, n = 0, \pm1, \pm2, \dots$$
We can see a solution exists.

Answer: False.