

## Answer on Question #58925 – Math – Trigonometry

### Question

1. Evaluate  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$ . Express your answer in radians.

### Solution

If  $\sin^{-1}$  means the inverse of the sine function, then

$$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}, \text{ that is, } \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45^\circ.$$

If  $\sin^{-1}(x) = \frac{1}{\sin(x)}$  then

$$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \frac{1}{\sin\left(\frac{\sqrt{2}}{2}\right)} \approx \frac{1}{\sin(0.707)} \approx \frac{1}{0.65} \approx 1.539.$$

**Answer:**  $\frac{\pi}{4}$ .

### Question

2. Is the value  $\frac{\pi}{16}$  a solution for the equation  $2\cos^2(4x) - 1 = 0$ ?

False

True

### Solution

Let  $x = \frac{\pi}{16}$ . Then

$$2\cos^2(4x) - 1 = 2\cos^2\left(4 \cdot \frac{\pi}{16}\right) - 1 = 2\cos^2\left(\frac{\pi}{4}\right) - 1 = 2\left(\frac{\sqrt{2}}{2}\right)^2 - 1 = 2 \cdot \frac{2}{4} - 1 = 1 - 1 = 0 \Rightarrow$$

$\Rightarrow x = \frac{\pi}{16}$  is a solution for the equation  $2\cos^2(4x) - 1 = 0$ , hence it is true.

**Answer:** True.

### Question

3. Is the value  $\frac{3\pi}{2}$  a solution for the equation  $2\sin^2(x) - \sin(x) - 1 = 0$ .

### Solution

$$\text{Let } x = \frac{3\pi}{2}. \text{ Then } 2\sin^2(x) - \sin(x) - 1 = 2\sin^2\left(\frac{3\pi}{2}\right) - \sin\left(\frac{3\pi}{2}\right) - 1 =$$

$$= 2\sin^2\left(\pi + \frac{\pi}{2}\right) - \sin\left(\pi + \frac{\pi}{2}\right) - 1 = 2(-1)^2 - (-1) - 1 = 2 + 1 - 1 = 2 \neq 0 \Rightarrow x = \frac{3\pi}{2} \text{ is not a}$$

solution for the equation  $2\sin^2(x) - \sin(x) - 1 = 0$ , hence it is false.

**Answer:** False.