Answer on Question #59340 – Math – Trigonometry

Question

The value $\frac{\pi}{24}$ is a solution for the equation $4\cos^2(4x)-3=0$.

False

True

Solution

$$4\cos^2\left(4\cdot\frac{\pi}{24}\right)-3=4\cos^2\left(\frac{\pi}{6}\right)-3=4\left(\frac{\sqrt{3}}{2}\right)^2-3=3-3=0.$$

Answer: True.

Question

Solve on the interval $[0, 2\pi)$:

$(\cos x+1)(2\cos^2 x-3\cos x-2)=0$

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

$x=\frac{\pi}{6},\ x=\frac{7\pi}{6}$

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

$x=2\pi,\ x=\frac{\pi}{2},\ x=\frac{5\pi}{4}$

Solution

$(\cos x+1)(2\cos^2 x-3\cos x-2)=0,\ 0\le x<2\pi;$

$\cos x+1=0,\ 0\le x<2\pi,$ or $2\cos^2 x-3\cos x-2=0,\ 0\le x<2\pi;$

$cos\, x+1=0,\ 0\le x<2\pi;$

$\cos x = -1, \quad 0 \le x < 2\pi$;

$x = \pi$;

$2\cos^2 x - 3\cos x - 2 = 0$, $0 \le x < 2\pi$;

$D = (-3)^2 - 4 \cdot 2 \cdot (-2) = 9 + 16 = 25$;

$\cos x = \frac{3+5}{2 \cdot 2} = \frac{8}{4} = 2$ or $\cos x = \frac{3-5}{2} = -1$, $0 \le x < 2\pi$;

$\cos x = 2$ does not have real solutions on $0 \le x < 2\pi$;

$\cos x = -\frac{1}{2}$ has solutions $x = \frac{2\pi}{3}$ and $x = \frac{4\pi}{3}$ on $0 \le x < 2\pi$.

Answer: $x = \frac{2\pi}{3}$, $x = \frac{4\pi}{3}$.

Question

Evaluate $\cot\left(\cos^{-1}\left(-\frac{15}{17}\right)\right)$. Enter your answer as a fraction using the slash bar (/)._____

Solution

$\cot(\cos^{-1}(x)) = x/\sqrt{1-x^2}$;

$$\cot\left(\cos^{-1}\left(-\frac{15}{17}\right)\right) = -\frac{15}{17} \Big/ \sqrt{1-\left(-\frac{15}{17}\right)^2} = -\frac{15}{17} \Big/ \frac{8}{17} = -\frac{15}{8} = -1.875.$$

Answer: $-15/8$.