

Math 112: Quiz 7.5:

1. Find all the solutions to the equation below. Show your steps.

$$\sin^2 x + 4\cos(x) = 4$$

x2

↓

$$1 - \cos^2 x + 4\cos x = 4$$

$$0 = \cos^2 x - 4\cos x + 3 \rightarrow x^2 - 4x + 3$$

$$+1 \quad 0 = (\cos x - 1)(\cos x - 3) \leftarrow (x-1)(x-3)$$

$$\cos x = 1 \quad \cos x = 3$$

$$x = 0 + 2k\pi$$

$$= 0^\circ + n360^\circ$$

+1/2

Impossible/no solution

+1/2

2. Find all the solutions to the equation below. For extra credit also find all the solutions in the interval $[0, 2\pi)$. Show your steps for both.

$$2\sin 3\theta + 1 = 0$$

$$\sin 3\theta = -\frac{1}{2} \quad +1$$

$$+1 \quad \frac{1}{3} \cdot 3\theta = \frac{1}{3} \cdot \frac{7\pi}{6} + \frac{1}{3} \cdot 2k\pi \rightarrow \theta = \frac{7\pi}{18} + 2k \frac{\pi}{3} \quad +1 \quad = +\frac{12\pi}{18}$$

$$= \frac{1}{3} \cdot \frac{11\pi}{6} + \frac{1}{3} \cdot 2k\pi \rightarrow \theta = \frac{11\pi}{18} + 2k \frac{\pi}{3}$$

$$\frac{7\pi}{18}, \frac{19\pi}{18}, \frac{31\pi}{18}, \frac{11\pi}{18}, \frac{23\pi}{18}, \frac{35\pi}{18} \quad +1 \times c$$

$$\text{or} \quad \frac{1}{3} \cdot 3\theta = \frac{1}{3} \cdot 210^\circ + \frac{1}{3} \cdot n360^\circ \rightarrow \theta = 70^\circ + n120^\circ$$

$$\frac{1}{3} \cdot 3\theta = \frac{1}{3} \cdot 330^\circ + \frac{1}{3} \cdot n360^\circ \rightarrow \theta = 110^\circ + n120^\circ$$

$$70^\circ, 190^\circ, 310^\circ, 110^\circ, 230^\circ, 350^\circ$$

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