

Instructions: Show all work. Use exact answers unless specifically asked to round. Answer all parts of each question.

1. Solve the equations. Report all solutions on $[0, 2\pi)$.

a. $\cos x = \sin 2x$

$$\cos x = 2 \sin x \cos x$$

$$\cos x = 0 \rightarrow x = \pi/2, 3\pi/2$$

$$2 \cos x \sin x - \cos x = 0$$

$$2 \sin x - 1 = 0 \Rightarrow$$

$$\cos x (2 \sin x - 1) = 0$$

$$\sin x = \frac{1}{2} \Rightarrow x = \pi/6, 5\pi/6$$

b. $3 \cos^2 x - 8 \cos x - 3 = 0$

$$u = \cos x$$

$$3u^2 - 8u - 3 = 0$$

$$(3u + 1)(u - 3) = 0$$

$$u - 3 = 0$$

$$u = 3 \rightarrow$$

$$3u + 1 = 0$$

$$\cos x = 3 \text{ not possible}$$

$$u = -1/3$$

$$\cos x = -1/3 \Rightarrow x \approx 1.9106 \text{ radians}, 4.37255... \text{ radians}$$

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

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

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

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$$\theta = 5\pi/3, 4\pi/3, 11\pi/3, 10\pi/3, 17\pi/3, 16\pi/3$$

$$3x = 5\pi/9, 4\pi/9, 11\pi/9, 10\pi/9, 17\pi/9, 16\pi/9$$