

**Math 112: #18 A/B/C/D**A) Find *all* the solutions to the equation  $3\sin^2\theta - \cos^2\theta = 0$ .

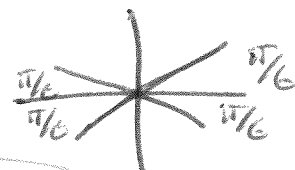
$$3\sin^2\theta - (1 - \sin^2\theta) = 0$$

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

$$4\sin^2\theta - 1 = 0$$

$$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{4}}$$

$$\sin\theta = \pm \frac{1}{2}$$



$$\theta = \frac{\pi}{6} + \pi n$$

$$\theta = \frac{5\pi}{6} + \pi n \quad n \in \mathbb{Z}$$

~~Part~~ →

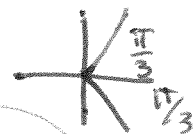
B) Find *all* the solutions to the equation  $4\cos^2\theta - 4\cos\theta = -1$ .

$$4\cos^2\theta - 4\cos\theta + 1 = 0$$

$$(2\cos\theta - 1)(2\cos\theta - 1) = 0$$

$$\text{both } 2\cos\theta - 1 = 0$$

$$\cos\theta = \frac{1}{2}$$



$$\theta = \frac{\pi}{3} + 2\pi n$$

$$\theta = \frac{5\pi}{3} + 2\pi n$$

 $n \in \mathbb{Z}$

C) Find *all* the solutions to the equation  $2\cos^2\theta + \sin\theta = 1$ .

$$2(1 - \sin^2\theta) + \sin\theta = 1$$

$$2 - 2\sin^2\theta + \sin\theta = 1$$

$$0 = 2\sin^2\theta - \sin\theta - 1$$

$$(2\sin\theta + 1)(\sin\theta - 1)$$

$$2\sin\theta + 1 = 0 \quad \sin\theta - 1 = 0$$

$$\frac{\pi}{6} \times \frac{\pi}{6} \quad \sin\theta = -\frac{1}{2} \quad \sin\theta = 1$$

$$\theta = \frac{7\pi}{6} + 2\pi n$$

$$\theta = \frac{\pi}{2} + 2\pi n$$

$$\theta = \frac{11\pi}{6} + 2\pi n$$

$$n \in \mathbb{Z}$$

D) Find *all* the solutions to the equation  $1 + \sin\theta = 2\cos^2\theta$ .

$$1 + \sin\theta = 2(1 - \sin^2\theta)$$

$$1 + \sin\theta = 2 - 2\sin^2\theta$$

~~or~~

$$2\sin^2\theta + \sin\theta - 1 = 0$$

$$(2\sin\theta - 1)(\sin\theta + 1) = 0$$

$$2\sin\theta - 1 = 0 \quad \sin\theta + 1 = 0$$

$$\sin\theta = \frac{1}{2}$$

$$\sin\theta = -1$$

$\frac{\pi}{6} \times \frac{\pi}{6}$

$$\theta = \frac{\pi}{6} + 2\pi n$$

$$\theta = \frac{3\pi}{2} + 2\pi n$$

$$\theta = \frac{5\pi}{6} + 2\pi n$$

$$n \in \mathbb{Z}$$