



7.5 Day 2

Find all solutions in the interval $0 \leq \theta < 2\pi$.

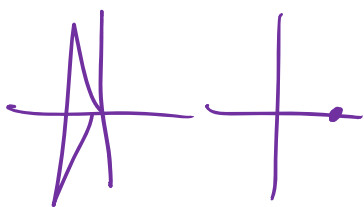
1. $\sin^2 \theta + \sin \theta = 0$

$\sin \theta (\sin \theta + 1) = 0$
 $\sin \theta = 0, \sin \theta + 1 = 0$

 $\theta = 0, \pi, 2\pi, \frac{3\pi}{2}$

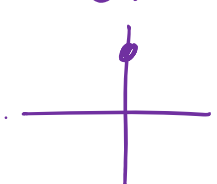
2. $2 \cos^2 \theta + \cos \theta = 0$

$\cos \theta (2 \cos \theta + 1) = 0$
 $\cos \theta = 0, 2 \cos \theta + 1 = 0$

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

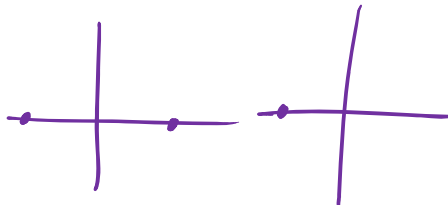
3. $2 \cos^2 \theta - \cos \theta = 1$

$2 \cos^2 \theta - \cos \theta - 1 = 0$
 $(2 \cos \theta + 1)(\cos \theta - 1) = 0$
 $2 \cos \theta + 1 = 0, \cos \theta - 1 = 0$

 $\theta = \frac{2\pi}{3}, \frac{4\pi}{3}, 0, 2\pi$

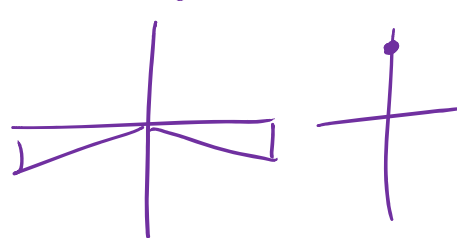
4. $\sin^2 \theta - 2 \sin \theta + 1 = 0$

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

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

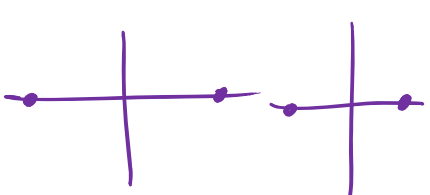
5. $\sin \theta + \sin \theta \cos \theta = 0$

$\sin \theta (1 + \cos \theta) = 0$
 $\sin \theta = 0, 1 + \cos \theta = 0$

 $\theta = 0, \pi, 2\pi$

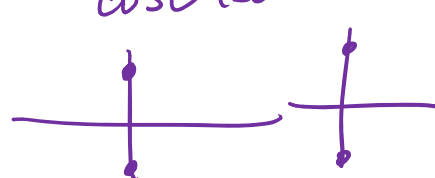
6. $2 \sin^2 \theta = \sin \theta + 1$

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

 $\theta = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$

7. $\cos^2 \theta \sin \theta = \sin \theta$

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

 $\theta = 0, \pi, 2\pi$

8. $\sin^2 \theta \cos \theta = \cos \theta$

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

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

Calculator allowed! Find all solutions.

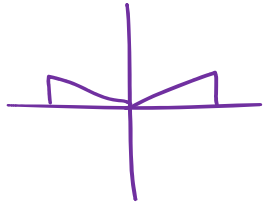
9. $10\sin\theta - 3 = 0$

$$\sin\theta = \frac{3}{10}$$

$$\beta = 0.305$$

$$\theta = 0.305 + 2\pi k,$$

$$2.837 + 2\pi k$$



10. $\cos\theta - 3 = 0$

$$\cos\theta = 3$$

No solution!

Max value of $\cos = 1$

11. $3\sin^2\theta - 8\cos\theta = 0$

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

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

$$3(1 - \cos^2\theta) - 8\cos\theta = 0$$

$$-3 + 3\cos^2\theta + 8\cos\theta = 0$$

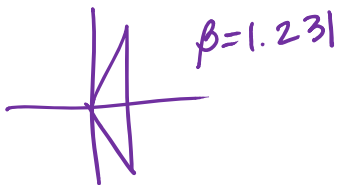
$$(3\cos\theta - 1)(\cos\theta + 3) = 0$$

$$3\cos\theta - 1 = 0 \quad \cos\theta + 3 = 0$$



$$\cos\theta = \frac{1}{3}$$

↓
No solution



$$\beta = 1.231$$

$$\theta = 1.231 + 2\pi k,$$

$$5.052 + 2\pi k$$

12. $4\cos^2\theta = 15\sin\theta$

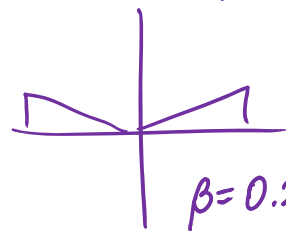
$$4(1 - \sin^2\theta) - 15\sin\theta = 0$$

$$-4 + 4\sin^2\theta + 15\sin\theta = 0$$

$$(4\sin\theta - 1)(\sin\theta + 4) = 0$$

↓
No solution

$$\sin\theta = \frac{1}{4}$$



$$\beta = 0.253$$

$$\theta = 0.253 + 2\pi k,$$

$$2.889 + 2\pi k$$