

**GO COUGARS!**

### Homework Questions

In Exercises 1-6, verify that each  $x$ -value is a solution of the equation.

1. $2\cos x - 1 = 0$	(a) $x = \frac{\pi}{3}$	(b) $x = \frac{2\pi}{3}$	$3\tan^2(2\pi) - 1 = 0$
2. $\sec x - 2 = 0$	(a) $x = \frac{\pi}{3}$	(b) $x = \frac{2\pi}{3}$	$3\tan^2(\frac{\pi}{3}) - 1 = 0$
3. $\tan^2 2x - 1 = 0$	(a) $x = \frac{\pi}{12}$	(b) $x = \frac{5\pi}{12}$	$3(\frac{\pi}{3})^2 - 1 = 0$
4. $4\cos^2 2x - 2 = 0$	(a) $x = \frac{\pi}{6}$	(b) $x = \frac{5\pi}{6}$	$3(\frac{\pi}{6})^2 - 1 = 0$
5. $\tan^2 x - \sin x - 1 = 0$	(a) $x = \frac{\pi}{2}$	(b) $x = \frac{3\pi}{2}$	$1 - 1 = 0 \checkmark$
6. $\tan^2 x = 2$	(a) $x = \frac{\pi}{4}$	(b) $x = \frac{3\pi}{4}$	$2\sin^2(\frac{\pi}{3}) - \sin(\frac{\pi}{3}) - 1 = 0$

In Exercises 7-14, solve the equation.

7. $\sqrt{3}\tan x + 1 = 0$	26. $\sqrt{2}\sin x + 1 = 0$
8. $\sqrt{3}\tan x - 2 = 0$	27. $\sec x + 1 = 0$
9. $3\cos^2 x - 4 = 0$	28. $3\cos^2 x - 1 = 0$
10. $2\cos^2 x - 1 = 0$	29. $\cos \sin x - 1 = 0$
11. $\tan^2 x = \tan x$	30. $\cos \sin x - 1 = 0$
12. $3\tan^2 x - 10\tan^2 x - 3 = 0$	31. $\sec x + \cos x = 1$

In Exercises 35-48, find all solutions of the equation in the interval  $[0, 2\pi)$  algebraically. Use the table feature of a graphing utility to check your answers numerically.

35. $\tan x + \sqrt{3} = 0$	36. $2\sin x + 1 = 0$
37. $\sec^2 x - 2 = 0$	38. $\tan^2 x - 1 = 0$
39. $\tan^2 x = \tan x$	39. $2\sin^2 x - 2 + \cos x$
40. $\sec^2 x - \sec x = 2$	42. $\sec x \csc x = 2\cos x$
41. $\sin x + \cos x = 0$	43. $\sec x + \tan x = 1$
44. $\cos x + \sin x = 2$	44. $\sin^2 x + \cos x = 1$
45. $\cos^2 x + \sin x = 2$	45. $\sin^2 x + \cos x = 1$
46. $\sec^2 x + \tan x = 3$	46. $2\cos^2 x + \cos x - 1 = 0$

**Handwritten Solutions:**

$3\tan^2(2\pi) - 1 = 0$   
 $3\tan^2(\frac{\pi}{3}) - 1 = 0$   
 $3(\frac{\pi}{3})^2 - 1 = 0$   
 $3(\frac{\pi}{6})^2 - 1 = 0$   
 $1 - 1 = 0 \checkmark$

$2\sin^2(\frac{\pi}{3}) - \sin(\frac{\pi}{3}) - 1 = 0$   
 $2(1)^2 - 1 - 1 = 0$   
 $0 = 0 \checkmark$

$\sqrt{3}\sec x - 2 = 0$   
 $\sec x = \frac{2}{\sqrt{3}}$   
 $\cos x = \frac{\sqrt{3}}{2}$   
 $\frac{\pi}{6}, \frac{11\pi}{6}$   
 $\frac{\pi}{6} + 2k\pi, \frac{11\pi}{6} + 2k\pi$

$\sin^2 x = 3\cos^2 x$   
 $\sin^2 x - 3\cos^2 x = 0$   
 $1 - \cos^2 x - 3\cos^2 x = 0$   
 $1 - 4\cos^2 x = 0$   
 $-4\cos^2 x = -1$   
 $\cos^2 x = \frac{1}{4}$   
 $\cos x = \pm \frac{1}{2}$   
 $\frac{\pi}{3}, \frac{5\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}$   
 $\frac{\pi}{3} + k\pi, \frac{2\pi}{3} + k\pi$

$3\tan^2 x = \tan x$   
 $3\tan^2 x - \tan x = 0$   
 $\tan x(3\tan x - 1) = 0$   
 $\tan x = 0$  or  $3\tan x - 1 = 0$   
 $\tan x = 0 \implies x = 0, \pi$   
 $3\tan x = 1 \implies \tan x = \frac{1}{3}$   
 $x = \arctan(\frac{1}{3})$   
 $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$   
 $\frac{\pi}{3} + k\pi, \frac{5\pi}{3} + k\pi$

$\sec^2 x + \tan x = 3$   
 $\sec^2 x + \tan x - 3 = 0$   
 $\tan^2 x + 1 + \tan x - 3 = 0$   
 $\tan^2 x + \tan x - 2 = 0 \implies a^2 + a - 2 = 0$   
 $(\tan x + 2)(\tan x - 1) = 0 \implies (a+2)(a-1)$   
 $\tan x = -2$  or  $\tan x = 1$   
 $\tan^{-1}(-2) = x$  or  $x = \frac{\pi}{4}$   
 $\arctan(-2) = x$  or  $x = \frac{3\pi}{4}$

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## 5.3 Solving Trig Equations Day 2

### Multiple Angles Problems

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We will use the domain  $[0, 2\pi)$

1.  $\cos 2x = 0$

$$\frac{2x}{2} = \left( \underbrace{\frac{\pi}{2}, \frac{3\pi}{2}}_{\text{set 1}}, \underbrace{\frac{5\pi}{2}, \frac{7\pi}{2}}_{+2\pi} \right) \frac{1}{2}$$

$$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \quad \frac{1}{2} \left( \underbrace{\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}}_{\text{set 1}}, \underbrace{\frac{9\pi}{2}, \frac{11\pi}{2}, \frac{13\pi}{2}, \frac{15\pi}{2}}_{\text{set 2}} \right)$$

$$x = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{5\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{11\pi}{8}, \frac{13\pi}{8}, \frac{15\pi}{8}$$

2.  $\frac{2\sin^2 2x}{2} = \frac{1}{2}$

$$\sin^2 2x = \frac{1}{2}$$

$$\sin 2x = \pm \frac{1}{\sqrt{2}}$$

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

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

$$3x = \left( \underbrace{\frac{\pi}{3}, \frac{2\pi}{3}}_{\text{set 1}}, \underbrace{\frac{7\pi}{3}, \frac{8\pi}{3}}_{\text{set 2}}, \underbrace{\frac{13\pi}{3}, \frac{14\pi}{3}}_{\text{set 3}} \right)$$

$$x = \frac{\pi}{9}, \frac{2\pi}{9}, \frac{7\pi}{9}, \frac{8\pi}{9}, \frac{13\pi}{9}, \frac{14\pi}{9}$$

4.  $\tan \frac{x}{2} = 1$

$$2 \left( \frac{x}{2} = \frac{\pi}{4}, \frac{5\pi}{4} \right)$$

$$x = \frac{2\pi}{4}, \frac{10\pi}{4}$$

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

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Solve over  $[0, 2\pi)$ .

5.  $4\sin x = \cos x - 2$

 $Y_1$   $Y_2$ 

intersect

 $x$ -coordinate

$x = 3.89, 6.02$

calculator

6.  $y = \cos x$   
 $y = x + x^2$

 $Y_1$  } intersect  
 $Y_2$  }

$x = 0.55$

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## HOMEWORK



p 376 49, 52 (no calc)

53-59 (calc)

63-71 odd,

77-87 odd (calc)

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