Warm up

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GO COUGARS!

p 396 Homework Questions

In Exercises 1–6, verify that the x-values are solutions of the equation.

5. $2\sin^2 x - \sin x - 1 = 0$

(a) $x = \frac{\pi}{2}$ ✓ (b) $x = \frac{7\pi}{6}$

In Exercises 7–20, solve the equation.

7. $2\cos x + 1 = 0$
9. $\sqrt{3}\csc x - 2 = 0$
11. $3\sec^2 x - 4 = 0$
13. $\sin x(\sin x + 1) = 0$
15. $4\cos^2 x - 1 = 0$
17. $2\sin^2 2x = 1$
19. $\tan 3x(\tan x - 1) = 0$

$\sin x(\sin x + 1) = 0$

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

In Exercises 21–34, find all solutions of the equation in the interval $[0, 2\pi)$.

21. $\cos^2 x = \cos x$
23. $3\tan^3 x = \tan x$
25. $\sec^2 x - \sec x = 2$
27. $2\sin x + \csc x = 0$
29. $2\cos^2 x + \cos x - 1 = 0$
31. $2\sec^2 x + \tan^2 x - 3 = 0$
33. $\sec x + \cot x = 1$

$\tan 3x(\tan x - 1) = 0$

$\tan 3x = 0 \quad \tan x = 1$

$3x = 0, \pi, 2\pi, 3\pi, 4\pi, 5\pi \quad x = \frac{\pi}{4}, \frac{5\pi}{4}$

$x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$

In Exercises 35–40, solve the multiple-angle equation.

35. $\cos 2x = \frac{1}{2}$
37. $\tan 3x = 1$
39. $\cos\frac{x}{2} = \frac{\sqrt{2}}{2}$

In Exercises 45–54, use a graphing utility to approximate the solutions (to three decimal places) of the equation in the interval $[0, 2\pi)$.

47. $\frac{1+\sin x}{\cos x} + \frac{\cos x}{1+\sin x} = 4$

In Exercises 55–58, use the Quadratic Formula to solve the equation in the interval $[0, 2\pi)$. Then use a graphing utility to approximate the angle x.

57. $\tan^2 x + 3\tan x + 1 = 0$

$(\csc x + \cot x)^2 = 1^2$

$\csc^2 x + 2\csc x\cot x + \cot^2 x = 1$

$1 + \cot^2 x + 2\csc x\cot x + \cot^2 x = 1$

$2\cot^2 x + 2\csc\cot x = 0$

$2\cot x(\cot x + \csc x) = 0$

$2\cot x = 0 \quad \frac{\cos x}{\sin x} + \frac{1}{\sin x} = 0$

$\cot x = 0 \quad \cos x + 1 = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2} \quad \cos x = -1$

$x = \pi$

$\tan x = \frac{-3 \pm \sqrt{9 - 4(1)(1)}}{2(1)}$

$\tan x = \frac{-3 \pm \sqrt{5}}{2}$

47 $\frac{1 + 2\sin x + \sin^2 x + \cos^2 x}{\cos x(1 + \sin x)} = 4$

$\frac{2(1 + \sin x)}{\cos x(1 + \sin x)} = 4$

$2 = 4\cos x$

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

$\frac{\pi}{3}, \frac{5\pi}{3} = x$

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5.4 Sum & Difference Formulas part 1

$$\sin(u+v) = \sin u \cos v + \cos u \sin v$$
$$\sin(u-v) = \sin u \cos v - \cos u \sin v$$
$$\cos(u+v) = \cos u \cos v - \sin u \sin v$$
$$\cos(u-v) = \cos u \cos v + \sin u \sin v$$
$$\tan(u+v) = \frac{\sin(u+v)}{\cos(u+v)} = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$
$$\tan(u-v) = \frac{\sin(u-v)}{\cos(u-v)} = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

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$\sin 75° =$ $\sin(45+30)$

$\sin 45 \cos 30 + \cos 45 \sin 30$

$\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right)$

$\frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{4}$

$\cos(\frac{\pi}{12}) =$ $\cos\left(\frac{3\pi}{12} - \frac{2\pi}{12}\right) = \cos\left(\frac{\pi}{4} - \frac{\pi}{6}\right)$

$= \cos\frac{\pi}{4}\cos\frac{\pi}{6} + \sin\frac{\pi}{4}\sin\frac{\pi}{6}$

$\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right)$

$\frac{\sqrt{3}+1}{2\sqrt{2}}$

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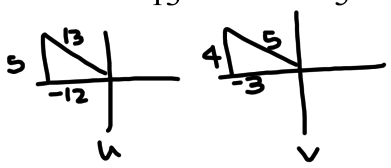
To find exact values:

Find $\cos(u-v)$ given $\sin u = \frac{5}{13}$, $\cos v = -\frac{3}{5}$, in QII



$\cos u \cos v + \sin u \sin v$

$\left(\frac{-12}{13}\right)\left(\frac{-3}{5}\right) + \left(\frac{5}{13}\right)\left(\frac{4}{5}\right)$

$\frac{36}{65} + \frac{20}{65}$

$\frac{56}{65}$

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$\cos 25° \cos 20° - \sin 25° \sin 20°$

$\cos(25+20)$

$\cos 45$

$\frac{1}{\sqrt{2}}$

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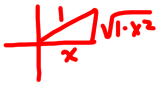
$\sin(\arctan 1 + \arccos x)$

$\sin(\arctan 1)\cos(\arccos x) + \cos(\arctan 1)\sin(\arccos x)$

$\sin\left(\frac{\pi}{4}\right) \quad x \quad + \quad \cos\left(\frac{\pi}{4}\right) \quad \left(\sqrt{1-x^2}\right)$



$\frac{1}{\sqrt{2}} x \quad + \quad \frac{1}{\sqrt{2}}\left(\sqrt{1-x^2}\right)$

$\frac{x+\sqrt{1-x^2}}{\sqrt{2}}$

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Proving Cofunction Identity:

$\sin\left(x-\frac{\pi}{2}\right) = -\cos x$

$\sin x \cos\frac{\pi}{2} - \cos x \sin\frac{\pi}{2}$

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

$-\cos x = -\cos x$

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Solve:

$$\sin(x+\frac{\pi}{2})+\sin(x-\frac{3\pi}{2})=1 \qquad [0,2\pi)$$

$(\sin x\cos\frac{\pi}{2} + \cos x\sin\frac{\pi}{2}) + (\sin x\cos\frac{3\pi}{2} - \cos x\sin\frac{3\pi}{2}) = 1$

$\cos x + \cos x = 1$

$2\cos x = 1$

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

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

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HOMEWORK

p 404 3, 9, 17, 19, 23, 25, 31, 33, 37, 43, 47, 51-55 odd, 59, 61, 65, 71

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