GO COUGARS!

p 404 **Homework Questions**

In Exercises 1–6, find the exact value of each expression.

3. (a) $\cos\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$

In Exercises 7–22, find the exact values of the sine, cosine, and tangent of the angle by using a sum or difference formula.

9. $195^\circ = 225^\circ - 30^\circ$

17. -165°

19. $\frac{13\pi}{12}$

In Exercises 23–30, write the expression as the sine, cosine, or tangent of an angle.

23. $\cos 25^\circ \cos 15^\circ - \sin 25^\circ \sin 15^\circ$

25. $\frac{\tan 325^\circ - \tan 86^\circ}{1 + \tan 325^\circ \tan 86^\circ}$

In Exercises 31–36, find the exact value of the expression.

31. $\sin 330^\circ \cos 30^\circ - \cos 330^\circ \sin 30^\circ$

33. $\sin\frac{\pi}{12}\cos\frac{\pi}{4} + \cos\frac{\pi}{12}\sin\frac{\pi}{4}$

In Exercises 37–44, find the exact value of the trigonometric function given that $\sin u = \frac{5}{13}$ and $\cos v = -\frac{3}{5}$. (Both u and v are in Quadrant II.)

37. $\sin(u + v)$

In Exercises 45–50, find the exact value of the trigonometric function given that $\sin u = -\frac{7}{25}$ and $\cos v = -\frac{4}{5}$. (Both u and v are in Quadrant III.)

43. $\sec(v - u)$

In Exercises 51–54, write the trigonometric expression as an algebraic expression.

47. $\tan(u - v)$

In Exercises 55–64, verify the identity.

51. $\sin(\arcsin x + \arccos x)$

53. $\cos(\arccos x + \arcsin x)$

55. $\sin(3\pi - x) = \sin x$

59. $\cos(\pi - \theta) + \sin\left(\frac{\pi}{2} + \theta\right) = 0$

61. $\cos(x + y)\cos(x - y) = \cos^2 x - \sin^2 y$

In Exercises 65–68, simplify the expression algebraically and use a graphing utility to confirm your answer graphically.

65. $\cos\left(\frac{3\pi}{2} - x\right)$

In Exercises 69–72, find all solutions of the equation in the interval $[0, 2\pi)$.

71. $\cos\left(x + \frac{\pi}{4}\right) - \cos\left(x - \frac{\pi}{4}\right) = 1$

7, 8, 16, 14

$\ln(1-\cos\theta) - 2\ln|\sin\theta|$

$\ln\left(\frac{1-\cos\theta}{\sin^2\theta}\right)$

$\ln\frac{1-\cos\theta}{1-\cos^2\theta}$

$\ln\frac{1}{1+\cos\theta}$

$-\ln(1+\cos\theta)$

$\frac{\sec^2 x}{\tan x}$

$\sec^2 x \cot x$

$\frac{1}{\cos^2 x}\cdot\frac{\cos x}{\sin x}$

$\sec x \csc x$

$\frac{\tan x + \cot y}{\tan x \cot y}$

$\frac{\cancel{\tan x}}{\cancel{\tan x}\cot y} + \frac{\cancel{\cot y}}{\tan x \cancel{\cot y}}$

$\tan y + \cot x$

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5.5 Multiple Angle & Power Reducing Formulas

Double Angle Formulas

Power Reducing Formulas

Half Angle Formulas

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Double Angle Formulas

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

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

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

$$= 1 - 2\sin^2 x$$

$\sin 2x = \sin(x+x)$

$\sin x \cos x + \cos x \sin x$

$2\sin x \cos x$

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Solve:

$$\cos 2x + \cos x = 0$$

$2\cos^2 x - 1 + \cos x = 0$

$2\cos^2 x + \cos x - 1 = 0$

$2a^2 + a - 1$

$(2a-1)(a+1)$

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

$\cos x = \frac{1}{2}$	$\cos x = -1$
RA $\frac{\pi}{3}$ Q1,4	
$x = \frac{\pi}{3}, \frac{5\pi}{3}$	$x = \pi$

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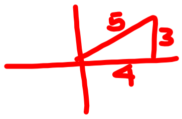
To find exact values:

Find $\sin 2u$, $\cos 2u$, $\tan 2u$ given $\sin u = \frac{3}{5}$ in QI



$$\sin 2u = 2\sin u\cos u$$
$$= 2\left(\frac{3}{5}\right)\left(\frac{4}{5}\right)$$
$$= \frac{24}{25}$$

$$\cos 2u = \cos^2 u - \sin^2 u$$
$$= \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$$
$$= \frac{16}{25} - \frac{9}{25}$$
$$= \frac{7}{25}$$

$$\tan 2u = \frac{\sin 2u}{\cos 2u}$$
$$= \frac{\frac{24}{25}}{\frac{7}{25}}$$
$$= \frac{24}{7}$$

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Power Reducing Formulas

$$\sin^2 u = \frac{1-\cos 2u}{2}$$

$$\cos^2 u = \frac{1+\cos 2u}{2}$$

$$\tan^2 u = \frac{1-\cos 2u}{1+\cos 2u}$$

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$$\cos^4 x = \cos^2 x \cos^2 x$$

$$= \left(\frac{1+\cos 2x}{2}\right)\left(\frac{1+\cos 2x}{2}\right)$$

$$= \frac{1+2\cos 2x+\cos^2 2x}{4}$$

$$\frac{2}{2}\ \frac{1+2\cos 2x+\left(\frac{1+\cos 4x}{2}\right)}{4}$$

$$\frac{2+4\cos 2x+1+\cos 4x}{8}$$

$$\frac{4\cos 2x+\cos 4x+3}{8}$$

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Half Angle Formulas

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$$

$$\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$$

$$\tan\frac{u}{2} = \frac{1-\cos u}{\sin u} = \frac{\sin u}{1+\cos u}$$

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Find the exact value of $\cos 105°$

$$\cos 105 = \cos \frac{210}{2}$$
$$= -\sqrt{\frac{1 + \cos 210}{2}}$$
$$= -\sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$
$$= -\sqrt{\frac{\frac{2}{2} - \frac{\sqrt{3}}{2}}{2}}$$
$$= -\sqrt{\frac{2-\sqrt{3}}{4}}$$
$$= -\frac{\sqrt{2-\sqrt{3}}}{2}$$

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Solve $\cos^2 x = \sin^2 \frac{x}{2}$

$$\cos^2 x = \left(\pm\sqrt{\frac{1-\cos x}{2}}\right)^2$$
$$\cos^2 x = \frac{1-\cos x}{2}$$
$$2\cos^2 x + \cos x - 1 = 0$$
$$(2\cos x - 1)(\cos x + 1) = 0$$

$\cos x = \frac{1}{2}$	$\cos x = -1$
$x = \frac{\pi}{3}, \frac{5\pi}{3}$	$x = \pi$

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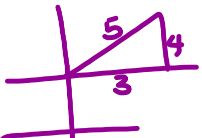
To find exact values

Find $\sin\frac{u}{2}$, $\cos\frac{u}{2}$, $\tan\frac{u}{2}$ when $\cos u = \frac{3}{5}$, $0 < u < \frac{\pi}{2}$



$\sin\frac{u}{2} = \sqrt{\frac{1-\cos u}{2}}$

$= \sqrt{\frac{1-\frac{3}{5}}{2}}$

$\sqrt{\frac{\frac{5}{5}-\frac{3}{5}}{2}}$

$\sqrt{\frac{\frac{2}{5}}{2}}$

$\sqrt{\frac{1}{5}}$

$\cos\frac{u}{2} = \sqrt{\frac{1+\cos u}{2}}$

$= \sqrt{\frac{1+\frac{3}{5}}{2}}$

$= \sqrt{\frac{\frac{8}{5}}{2}}$

$= \sqrt{\frac{8}{10}} = \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}}$

$\tan\frac{u}{2} = \sqrt{\frac{\frac{1}{5}}{\frac{4}{5}}}$

$= \sqrt{\frac{1}{4}}$

$= \frac{1}{2}$

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HOMEWORK

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