Do Section 2.4

33. Previous Answers LarTrig10 2.4.054. (3882549)

Im not sure what I did wrong

Reply | Move to Answered

Write the trigonometric expression as an algebraic expression.

sin(arctan 9x − arccos x)

$$\frac{9x^{2-\sqrt{1-x^2}}}{\sqrt{81x^2+1}}$$ ✗

$$\frac{9x^2-\sqrt{1-x^2}}{\sqrt{81x^2+1}}$$

→ the " $-\sqrt{1-x^2}$ " is in the exponent.
Hit "TAB" after the "2."

Do Section 2.5

12. Previous Answers LarTrig10 2.5.501.XP. (3882582)

Im not sure what I did wrong :(

Reply | Move to Answered

Use the half-angle formulas to simplify the expression.

$$\sqrt{\frac{1-\cos 6x}{2}}$$

$\sin(3x)$ ✗ $|\sin(3x)|$

Recall! $\cos(2x) = 2\cos^2(x) - 1$
$= 1 - 2\sin^2(x)$

½-angle's derived from double-angle.

$$1 - 2\sin^2(x) = \cos(2x)$$
$$-2\sin^2(x) = \cos(2x) - 1$$
$$2\sin^2(x) = 1 - \cos(2x)$$
$$\sin^2(x) = \frac{1-\cos(2x)}{2}$$
$$|\sin(x)| = \sqrt{\sin^2(x)} = \sqrt{\frac{1-\cos(2x)}{2}}$$
$$\sin(x) = \pm\sqrt{\frac{1-\cos(2x)}{2}}$$

28. Previous Answers LarTrig10 2.4.042.MI. (3882936)

How do I submit this answer, if it's correct? I used the formula cos(u)cos(v)+sin(u)sin(v)=. I got (4/5)(15/17)+(-3/5)(8/17)= 36/136 and then I simplified it to 9/34

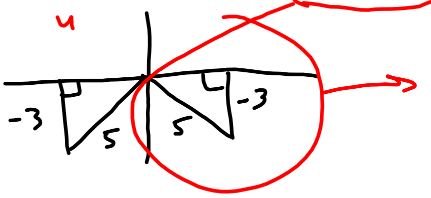
Reply
Quick Notes

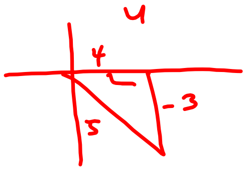
This is a good one for class. I don't remember one quite like this, but we have the techniques to tackle it.

Find the exact value of the trigonometric expression given that $\sin(u) = -\frac{3}{5}$, where $3\pi/2 < u < 2\pi$, and $\cos(v) = \frac{15}{17}$, where $0 < v < \pi/2$.

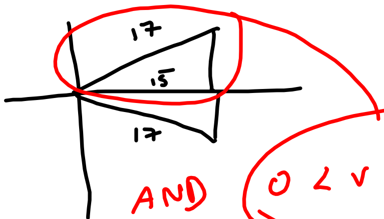
$\cos(u - v)$

9/34 ✗ 36/85

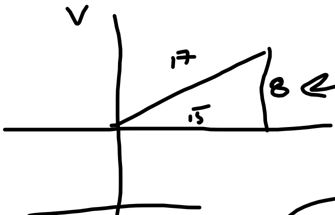




$\cos(v) = \frac{15}{17}$



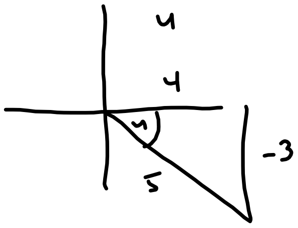
AND $0 < v < \frac{\pi}{2}$

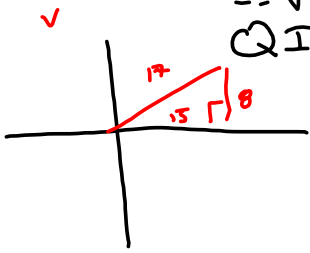


$\pm\sqrt{17^2 - 15^2} = \sqrt{289 - 225}$

$= \pm\sqrt{64} = \pm 8$

QI $\Rightarrow$ $y = +8$





$\cos(u - v) = \cos(u)\cos(v) + \sin(u)\sin v$

$= \left(\frac{4}{5}\right)\left(\frac{15}{17}\right) + \left(-\frac{3}{5}\right)\left(\frac{8}{17}\right) = \frac{60 - 24}{(5)(17)} = \boxed{\frac{36}{85}} = \cos(u - v)$

2.4 #s 35, 42 and 2.5 #s 5, 6

35. 0/1 points

Write the trigonometric expression as an algebraic expression.

$\cos(\arccos 9x - \arctan 9x) = \cos(u - v)$, where

$u = \arccos(9x)$ &

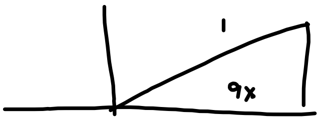
$v = \arctan(9x)$

$$\frac{9\sqrt{1-81x^2}\,x + 9x}{\sqrt{81x^2+1}}$$

Assume we're in QI for these

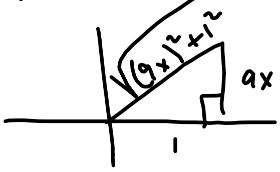
"trig-to-rectangular" situations. → Trigonometric Substitution training.

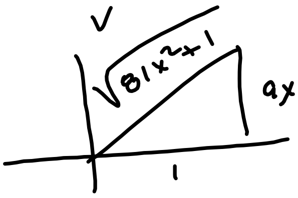
$u = \arccos(9x)$



$\sqrt{1^2 - (9x)^2} = \sqrt{1 - 81x^2}$

$v = \arctan(9x)$





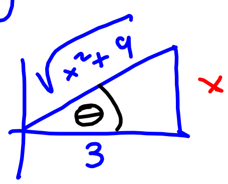
$\cos(u-v) = \cos(u)\cos(v) - \sin(u)\sin(v)$ +

$$= 9x\,\frac{1}{\sqrt{81x^2+1}} + \frac{\sqrt{1-81x^2}}{1}\cdot\frac{9x}{\sqrt{81x^2+1}}$$

$$= \frac{9x + \left(\sqrt{1-81x^2}\right)9x}{\sqrt{81x^2+1}}$$

Trig Subst in Calc II:

$\int \sqrt{x^2+9}\,dx$ is hard!



$\frac{x}{3} = \tan\theta$, so

$x = 3\tan\theta \Longrightarrow$

$dx = 3\sec^2\theta\,d\theta$

$\Longrightarrow \int \sqrt{(3\tan\theta)^2 + 3^2}\; 3\sec^2\theta\,d\theta$

$3\int \sqrt{3^2\tan^2\theta + 3^2}\,\sec^2\theta\,d\theta$

$3\int \sqrt{3^2(\tan^2\theta + 1)}\,\sec^2\theta\,d\theta$

$9\int \sqrt{\sec^2\theta}\,\sec^2\theta\,d\theta$

$= 9\int |\sec\theta|\,\sec^2\theta\,d\theta$ if $0 < \theta < \frac{\pi}{2}$, then

$= 9\int \sec^3\theta\,d\theta$

42. 0/1 points LarTrig

Find all solutions of the equation in the interval $[0, 2\pi)$. (Enter your answers as a comma-separated list.)

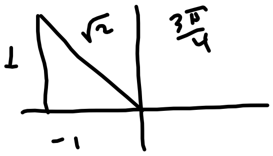
$$\cos\left(x + \frac{3\pi}{4}\right) - \cos\left(x - \frac{3\pi}{4}\right) = 1$$

$x =$ $\frac{5\pi}{4}, \frac{7\pi}{4}$

$\Rightarrow$

$\cos(x)\cos\left(\frac{3\pi}{4}\right) - \sin(x)\sin\left(\frac{3\pi}{4}\right)$

$-\left[\cos(x)\cos\left(\frac{3\pi}{4}\right) + \sin(x)\sin\left(\frac{3\pi}{4}\right)\right]$



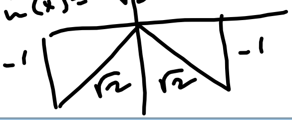
$= \cos(x)\left(-\frac{1}{\sqrt{2}}\right) - \left(\frac{1}{\sqrt{2}}\right)\sin(x)$

$- \cos(x)\left(-\frac{1}{\sqrt{2}}\right) - \left(\frac{1}{\sqrt{2}}\right)\sin(x) \quad = -\frac{2}{\sqrt{2}}\sin(x) = 1$

$\Rightarrow \sin(x) = -\frac{\sqrt{2}}{2}$ OR $-\frac{1}{\sqrt{2}}$

calculator says "-45°"

$\sin(x) = -\frac{1}{\sqrt{2}}$



$\frac{5\pi}{4}, \frac{7\pi}{4}$

5. 0/1 points LarTrig10 2.5.011. [3882832]

Solve the equation. (Find all solutions of the equation in the interval $[0, 2\pi)$. Enter your answers as a comma-separated list.)

$$4\sin(4x) = -8\sin(2x)$$

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

$\rightarrow$

$4(2\sin(2x)\cos(2x)) = -8\sin(2x) \rightarrow$

$8\sin(2x)\cos(2x) + 8\sin(2x) = 0$

$\Rightarrow 8\sin(2x)\left[\cos(2x) + 1\right] = 0 \Rightarrow$

Want all x's $\in [0, 2\pi)$

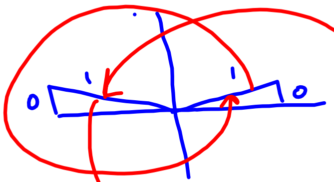
$0 \le x < 2\pi \Rightarrow$

$0 \le 2x < 4\pi$

Find all $2x \in [0, 4\pi)$ to secure all $x \in [0, 2\pi)$

$8\sin(2x) = 0$

$\sin(2x) = 0$



Keep going up to 4π!

$2x = 0, \pi, 2\pi, 3\pi, 4\pi$ oops! $\Rightarrow$ You went too far!

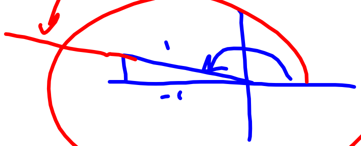
$$\boxed{\Rightarrow x = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}}$$

Final Ans.

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

$\cos(2x) = -1$

$\pi + 2\pi = 3\pi$



$2x = \pi, 3\pi$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$$

6. 0/1 points LarTrig10 2.5.013. [3882628]

Solve the equation. (Find all solutions of the equation in the interval $[0, 2\pi)$. Enter your answers as a comma-separated list.)

$7\tan(2x) - 7\cot(x) = 0$

$x =$ ✗ $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

$\frac{2\tan(u)}{1-\tan^2(u)} = \tan(2u)$

Failed to find these.

$7\left[\frac{2\tan(x)}{1-\tan^2(x)}\right] - 7\cot(x) = 0$

LCD = $1-\tan^2(x)$

$\frac{14\tan(x) - 7\cot(x)[1-\tan^2(x)]}{LCD} = 0 \Rightarrow$

$14\tan(x) - 7\cot(x) + 7\cot(x)\tan^2(x) = 0$

$14\tan(x) - 7\cot(x) + 7\tan(x) = 0$

21 ← $15\tan(x) - 7\cot(x) = 0$

21 ← $\frac{15\sin(x)}{\cos(x)} \cdot \frac{\sin(x)}{\sin(x)} - \frac{7\cos(x)}{\sin(x)} \cdot \frac{\cos(x)}{\cos(x)}$

21 ← $= \frac{15\sin^2(x) - 7\cos^2(x)}{\sin(x)\cos(x)} = 0$

21 ← $\Rightarrow 15(1-\cos^2(x)) - 7\cos^2(x) = 15 - 15\cos^2(x) - 7\cos^2(x) = 0$ (21, 21)

$\Rightarrow 21 - 21\cos^2(x) - 7\cos^2(x)$

$= 21 - 28\cos^2(x)$

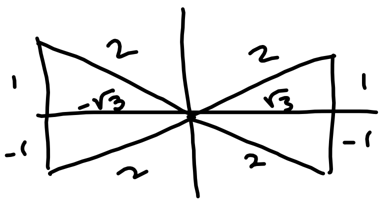
$= 7(3 - 4\cos^2(x)) = 0$

$\Rightarrow 4\cos^2(x) - 3 = 0$

$\Rightarrow 4\cos^2(x) = 3$

$\Rightarrow \cos^2(x) = \frac{3}{4}$

$\Rightarrow \cos(x) = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{\sqrt{4}} = \pm\frac{\sqrt{3}}{2}$



$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

I'm missing $\boxed{\frac{\pi}{2} \text{ \& } \frac{3\pi}{2}}$

whence?

$21\tan(x) - 7\cot(x) = 0$

OTHER APPROACH:

$21\tan(x) = 7\cot(x)$

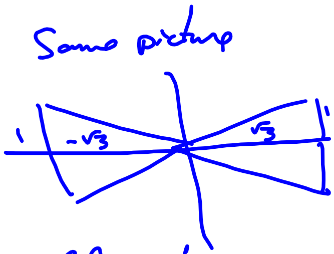
$\Rightarrow \dfrac{21\tan(x)}{7\cot(x)} = 1$

$3\tan^2(x) = 1$

$\tan^2(x) = \dfrac{1}{3}$

$\tan(x) = \pm\sqrt{\dfrac{1}{3}} = \pm\dfrac{1}{\sqrt{3}}$

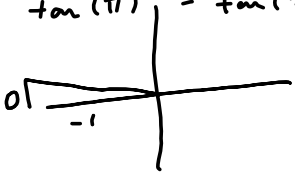
Same picture



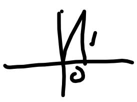
still not sure about the quadrant angles.

$7\tan(2x) = 7\cot(x)$?

$\tan(\pi) = \tan(2(\frac{\pi}{2}))$



$\cot(\frac{\pi}{2}) = 0$, too.



So I can SEE it, but my analysis wouldn't pick up on it.

Not one on the test.