

Math 130 - Quiz 7

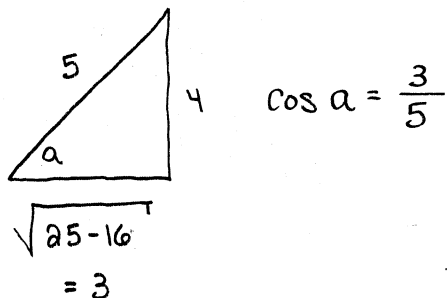
October 28, 2020

Name key

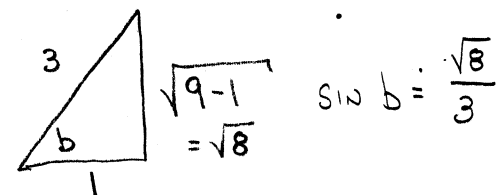
Score _____

The following problems are from the suggested homework. Show all work to receive full credit. Supply explanations when necessary. You must work individually on this quiz. This quiz is due November 4.

1. (2 points) Given that $\sin a = \frac{4}{5}$ and $\cos b = \frac{1}{3}$, with both a and b in the first quadrant, find $\sin(a - b)$ and $\cos(a + b)$.



$$\begin{aligned}\sin(a - b) &= \sin a \cos b - \cos a \sin b \\ &= \left(\frac{4}{5}\right)\left(\frac{1}{3}\right) - \left(\frac{3}{5}\right)\left(\frac{\sqrt{8}}{3}\right) = \frac{4 - 3\sqrt{8}}{15}\end{aligned}$$



$$\begin{aligned}\cos(a + b) &= \cos a \cos b - \sin a \sin b \\ &= \left(\frac{3}{5}\right)\left(\frac{1}{3}\right) - \left(\frac{4}{5}\right)\left(\frac{\sqrt{8}}{3}\right) = \frac{3 - 4\sqrt{8}}{15}\end{aligned}$$

2. (2 points) Find the exact value of $\cos(345^\circ)$ by writing 345° as a sum or difference of familiar angles and using a sum/difference formula.

$$345^\circ = 300^\circ + 45^\circ$$

$$\cos(345^\circ) = \cos(300^\circ + 45^\circ)$$

$$= \cos 300^\circ \cos 45^\circ - \sin 300^\circ \sin 45^\circ$$

$$= \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(-\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2} + \sqrt{6}}{4}$$

3. (2 points) Suppose x is in the 4th quadrant with $\tan x = -8$. Find the exact values of $\sin(2x)$, $\cos(2x)$, and $\tan(2x)$.

See Quiz 6 problem #1 For

$$\sin 2x = -\frac{16}{65}$$

$$\cos 2x = \frac{-63}{65}$$

AND IT FOLLOWS THAT

$$\tan 2x = \frac{-16/65}{-63/65} = \frac{16}{63}$$

4. (2 points) Suppose x is in the 3rd quadrant with $\sin x = -\frac{12}{13}$. Find the exact values of $\sin(\frac{x}{2})$, $\cos(\frac{x}{2})$, and $\tan(\frac{x}{2})$.

See Quiz 6 problem #3 For

$$\sin \frac{x}{2} = \sqrt{\frac{9}{13}}$$

AND $\frac{x}{2}$ IS IN QUAD 2.

IT FOLLOWS THAT

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

$$= -\sqrt{\frac{4}{13}}$$

AND

$$\tan \frac{x}{2} = \frac{\sqrt{9/13}}{-\sqrt{4/13}} = -\frac{3}{2}$$

5. (1 point) Rewrite as a sum or difference: $\sin(-x) \sin(5x)$

$$\sin(-x) \sin(5x) = \frac{1}{2} [\cos(-6x) - \cos(4x)]$$

$$= \frac{1}{2} (\cos 6x - \cos 4x)$$

6. (1 point) Rewrite as a product: $\cos(3x) + \cos(9x)$

$$\cos(3x) + \cos(9x) = 2 \cos(6x) \cos(-3x)$$

$$= 2 \cos(6x) \cos(3x)$$