

Unit 7: Trig Identities

Lesson 3: Sum and Difference Formulas

EQ:

❖ Part I: Values on Unit Circle

Recall: Evaluate.

1. 2. 3.

➤ Sum & Difference Formulas :

$$\sin(\alpha + \beta) = \underline{\hspace{15em}}$$

$$\sin(\alpha - \beta) = \underline{\hspace{15em}}$$

$$\cos(\alpha + \beta) = \underline{\hspace{15em}}$$

$$\cos(\alpha - \beta) = \underline{\hspace{15em}}$$

$$\tan(\alpha + \beta) = \underline{\hspace{15em}}$$

$$\tan(\alpha - \beta) = \underline{\hspace{15em}}$$

- How would you get the sum and difference for csc, sec, and cot?

Ex. Use the sum and difference formulas to write each expression as the sine, cosine, or tangent of a single angle.

1.  $\sin 80^\circ \cos 20^\circ - \cos 80^\circ \sin 20^\circ$       2.  $\cos 50^\circ \cos 40^\circ - \sin 50^\circ \sin 40^\circ$

- Practice Worksheet #1 "Sum and Difference Formula For Sine, Cosine, and Tangent"
- Assignment: textbook p. 408 #19 - 28

Ex. Evaluate using the sum and difference formulas.

3.  $\cos (165^\circ) =$

4.  $\sin \left( \frac{7\pi}{12} \right) =$

5.  $\cos (75^\circ) =$

6.  $\sec \left( \frac{\pi}{12} \right)$

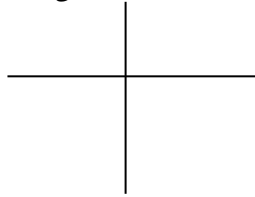
7.  $\csc 15^\circ$

8.  $\tan 105^\circ$

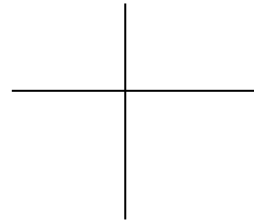
➤ Practice Worksheet #2 "Sum and Difference Formulas for Sine, Cosine, and Tangent"

❖ Part II: Values Not on Unit Circle

1. Given  $\sin \alpha = \frac{4}{5}$   $\frac{\pi}{2} < \alpha < \pi$



$\sin \beta = \frac{-2}{\sqrt{5}}$   $\pi < \beta < \frac{3\pi}{2}$

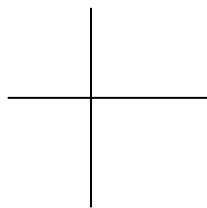


Find the exact value:

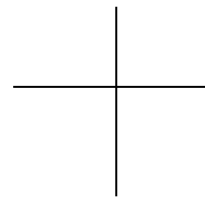
a)  $\cos(\alpha + \beta) =$

b)  $\sin(\alpha + \beta) =$

2. Given  $\sin \alpha = \frac{4}{5}$   $\frac{\pi}{2} < \alpha < \pi$

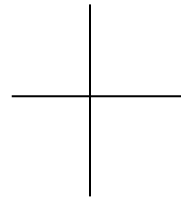


$\cos \beta = \frac{-5}{13}$   $\pi < \beta < \frac{3\pi}{2}$



a)  $\tan(\alpha + \beta) =$

3. Given  $\cos \theta = \frac{1}{4}$   $\frac{3\pi}{2} < \theta < 2\pi$



a)  $\sin \theta$

b)  $\sin(\theta - \frac{\pi}{6})$

c)  $\cos(\theta + \frac{\pi}{3})$

d)  $\tan(\theta - \frac{\pi}{4})$

➤ Practice Worksheet #3 "Sum and Difference Formulas for Sine , Cosine, and Tangent"

➤ Assignment: p. 408 #35 - 41 ODD

PART III: Verifying Trig Functions Using Sum and Difference Formulas

Ex. Simplify each expression.

1.  $\cos(\frac{\pi}{2} - \mathbf{x})$

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

3.  $\tan(\theta + 3\pi)$

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

5.  $\cos(\pi + \mathbf{x})$

6.  $\sin\left(\frac{3\pi}{2} + \theta\right)$

7.  $\tan(\pi + \theta)$

Ex. Verify that each equation is true.

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

2.  $\cos 2x = \cos^2 x - \sin^2 x$  [Hint:  $\cos 2x = \cos (x + x)$ ]

3.  $1 + \cos 2x - \cos^2 x = \cos^2 x$  [Hint: Use previous result.]

➤ Assignment textbook p. 408 #43 - 49 ODD