

Sum and Difference Formulas

$$\cos(a+b) = \cos a \cos b - \sin a \sin b$$

$$\cos(a-b) = \cos a \cos b + \sin a \sin b$$

$$\sin(a+b) = \sin a \cos b + \cos a \sin b$$

$$\sin(a-b) = \sin a \cos b - \cos a \sin b$$

Example 1) $\sin 75 = \sin(45+30) =$ _____
 = _____
 = _____

Example 2) $\cos 285 = \cos(45+240) =$ _____
 = _____
 = _____

Example 3) Prove $\sin(\pi - \theta) = \sin \theta$

Example 4) $\sec x = \frac{13}{5}$ in Q4, $\sin y = \frac{3}{5}$ in Q1

Find $\sin(x-y) =$ _____
 = _____
 = _____

2

Sum and Difference Formulas

$$\cos 165 = \cos(\quad + \quad)$$

$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$

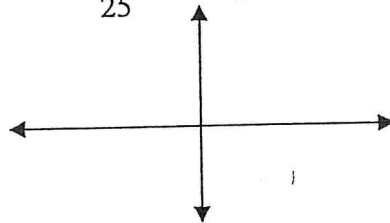
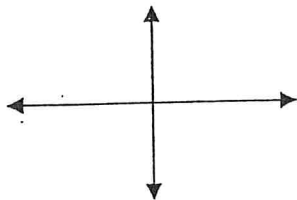
$$\sin 285 = \sin(\quad + \quad)$$

$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$

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

$$\underline{\hspace{15em}} = \sin x$$
$$\underline{\hspace{15em}} = \sin x$$

$\cos A = \frac{-12}{13}$ in Quad 2; $\sin B = \frac{-7}{25}$ in Quad 3



FIND $\sin(A + B)$

$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$
$$= \underline{\hspace{15em}}$$

Sum and Difference Practice ditto #2

$$\cos 75 = \cos(\quad + \quad) = \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$\sin 195 = \sin(\quad + \quad) = \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$\cos 15 = \cos(\quad - \quad) = \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$\cos 255 = \cos(\quad + \quad) = \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$$= \underline{\hspace{10em}}$$

$\sin A = -7/25$ in quad 4; $\cos B = 4/5$ in quad 1

Find $\sin(A-B)$

Find $\cos(A-B)$

4

1. $\sin 95^\circ \cos 55^\circ + \cos 95^\circ \sin 55^\circ$

2. $\cos 160^\circ \cos 40^\circ + \sin 160^\circ \sin 40^\circ$

3. $\sin(-165^\circ)$

4. $\cos(-75^\circ)$

5. $\cos(\pi - \theta) = -\cos \theta$

6. Find $\cos(x - y)$ if $\cos x = -\frac{3}{5}$, $90 < x < 180$ and $\cos y = \frac{5}{13}$, $0 < y < 90$

5-4: Sums & Differences Identities
Simplify the following

Homework Sheet #1

1. $\sin 95^\circ \cos 55^\circ + \cos 95^\circ \sin 55^\circ$

2. $\cos 160^\circ \cos 40^\circ + \sin 160^\circ \sin 40^\circ$

3. $\sin(-165^\circ)$

4. $\cos(-75^\circ)$

5. Verify $\cos(\pi - \theta) = -\cos \theta$

6. Find $\cos(x - y)$ if $\cos x = -\frac{3}{5}$, $90 < x < 180$ and $\cos y = \frac{5}{13}$, $0 < y < 90$

6

5-4: Sums and Differences Identities**Homework Sheet #2****Simplify Each Expression**

1. $\sin 75^\circ \cos 15^\circ + \cos 75^\circ \sin 15^\circ$

2. $\cos \frac{5\pi}{12} \cos \frac{\pi}{12} - \sin \frac{5\pi}{12} \sin \frac{\pi}{12}$

3. $\sin 3x \cos 2x - \cos 3x \sin 2x$

Prove that the given equation is an identity:

4. $\sin(x + \pi) = -\sin x$

5. $\cos\left(x + \frac{\pi}{2}\right)$

6. $\tan(2\pi - x) = -\tan x$

Find the exact value of each expression using the Sums and Difference formulas (no calculator)

7. $\cos 75^\circ$

8. $\cos 105^\circ$

9. $\sin(-15^\circ)$

10. $\sin \frac{7\pi}{12}$

11. $\tan \frac{5\pi}{12}$

12. $\tan 15^\circ$

Simplify each expression

13. $\sin(30^\circ + \theta) + \sin(30^\circ - \theta)$

14. $\cos\left(\frac{\pi}{3} + x\right) + \cos\left(\frac{\pi}{3} - x\right)$

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

16. $\frac{\tan \frac{\pi}{5} + \tan \frac{4\pi}{5}}{1 - \tan \frac{\pi}{5} \tan \frac{4\pi}{5}}$

8

5-4: Sum and Difference Identities**Homework Sheet #3**

1. $\cos 40^\circ \cos 20^\circ - \sin 40^\circ \sin 20^\circ$

2. $\sin \frac{\pi}{3} \cos \frac{\pi}{12} - \cos \frac{\pi}{3} \sin \frac{\pi}{12}$

3. $\sin 3y \cos y - \cos 3y \sin y$

4. $\frac{\tan 48^\circ + \tan 12^\circ}{1 - \tan 48^\circ \tan 12^\circ}$

Find the exact value:

5. $\sin \frac{11\pi}{12}$

6. $\cos \frac{17\pi}{12}$

7. $\tan \frac{\pi}{12}$

Verify each identity.

9. $\tan x - \tan y = \frac{\sin(x-y)}{\cos x \cos y}$

10. $\cot x - \tan y = \frac{\cos(x+y)}{\sin x \cos y}$

11. $\cos(\pi - \theta) = -\cos \theta$

12. $\sin(\pi + \theta) = -\sin$

13. $\tan(a+b) = \frac{\sin(a+b)}{\cos(a+b)}$

5-4 Tangent Sum and Difference Identity

Find the exact value of each.

1) $\tan -15$

2) $\tan -\frac{7\pi}{12}$

3) $\tan \frac{7\pi}{12}$

4) $\tan 15$

5) $\tan 105$

6) $\tan 195$

7)
$$\frac{\tan \frac{8\pi}{9} + \tan \frac{5\pi}{18}}{1 - \tan \frac{8\pi}{9} \tan \frac{5\pi}{18}}$$

8)
$$\frac{\tan 294 - \tan 144}{1 + \tan 294 \tan 144}$$

Verify each identity.

9)
$$\tan\left(\theta + \frac{\pi}{4}\right) = \frac{\tan \theta + 1}{1 - \tan \theta}$$

10)
$$\tan(\pi + \theta) = \tan \theta$$

