

**Sum and Difference Formulas**

$$\sin(u \pm v) = \sin(u)\cos(v) \pm \cos(u)\sin(v)$$

$$\cos(u \pm v) = \cos(u)\cos(v) \mp \sin(u)\sin(v)$$

$$\tan(u \pm v) = \frac{\tan(u) \pm \tan(v)}{1 \mp \tan(u)\tan(v)}$$

**Example 1**

Find the exact value of  $\tan(105^\circ)$ .

**Example 2**

Find the exact value of  $\cos\left(\frac{7\pi}{12}\right)$ .

**Example 3**

Given that  $\sin(u) = 5/13$ ,  $\cos(v) = -3/5$ , and both  $u$  and  $v$  are in Quadrant II, find the exact value of  $\sin(u + v)$ .

**Example 4**

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Write the trigonometric expression  $\sin(\arcsin(x) + \arccos(x))$  as an algebraic expression.

**Example 5**

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Find the solution(s) of the equation in the interval  $[0, 2\pi)$ .

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

In Exercises 1-4, find the exact values of the sine, cosine, and tangent of the angle.

1.  $195^\circ$

2.  $255^\circ$

3.  $\frac{11\pi}{12}$

4.  $-\frac{\pi}{12}$

In Exercises 5-7, find the exact value of the trigonometric function, given that  $\sin(u) = -8/17$  and  $\cos(v) = -4/5$ . (Both  $u$  and  $v$  are in Quadrant III.)

5.  $\tan(u + v)$

6.  $\sin(v - u)$

7.  $\cos(u - v)$

In Exercises 8-9, write the trigonometric expression as an algebraic expression.

8.  $\cos(\arccos(x) - \arcsin(x))$

9.  $\sin(\arctan(2x) - \arccos(x))$

In Exercises 10-11, find the solution(s) of the equation in the interval  $[0, 2\pi)$ .

10.  $\cos\left(x + \frac{\pi}{6}\right) - \cos\left(x - \frac{\pi}{6}\right) = 1$

11.  $\tan(x + \pi) + 2\sin(x + \pi) = 0$