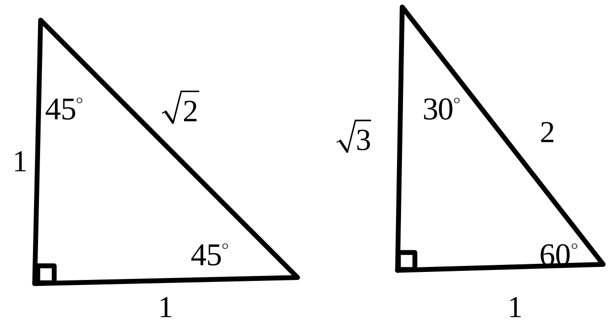
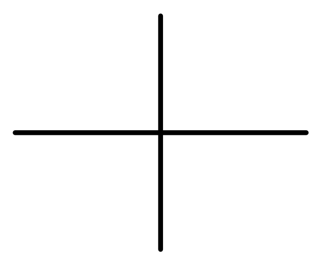
Sum and Difference Formulas

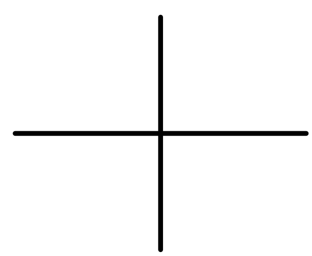
$$\sin(u+v) = \sin u \cos v + \cos u \sin v$$
$$\sin(u-v) = \sin u \cos v - \cos u \sin v$$
$$\cos(u+v) = \cos u \cos v - \sin u \sin v$$
$$\cos(u-v) = \cos u \cos v + \sin u \sin v$$
$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$
$$\tan(u-v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

Special Right Triangles



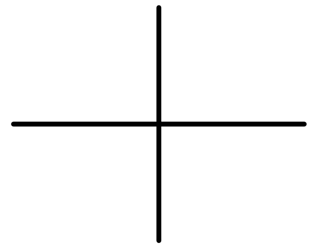
1. Find the exact value of the expression $\sin\left(\frac{2\pi}{3}+\frac{3\pi}{4}\right)$.

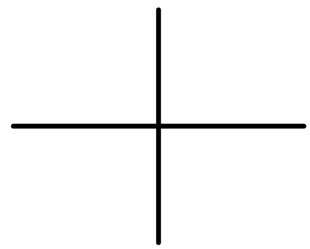




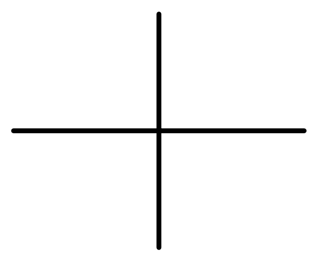
2. Use the sum and difference formulas to find the exact value of each.

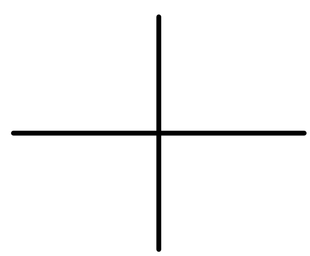
a) $\sin 105^\circ$





b) $\tan 165^\circ$





3. Use the sum and difference formulas to write the expression as a function of a single angle.

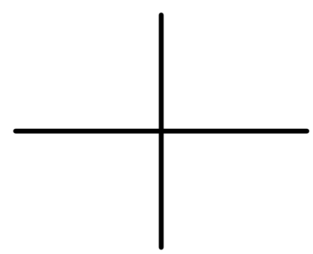
a) $\sin 340^\circ \cos 50^\circ - \cos 340^\circ \sin 50^\circ$

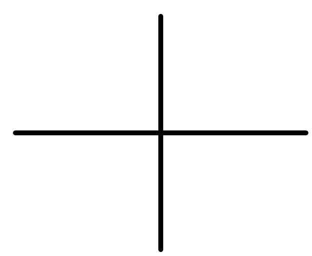
b) $\dfrac{\tan 140^\circ - \tan 60^\circ}{1 + \tan 140^\circ \tan 60^\circ}$

4. Find the exact value of $\cos(u - v)$ if:

$\sin u = \dfrac{5}{13}$ where $\dfrac{\pi}{2} < u < \pi$

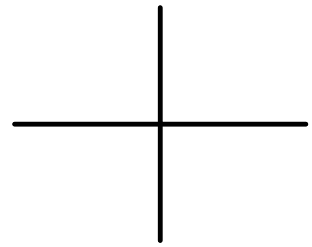
$\cos v = -\dfrac{3}{5}$ where $\pi < v < \dfrac{3\pi}{2}$





5. Verify the identity.

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



6. Find all solutions of the equation in the interval $0 \le x < 2\pi$.

$$\sin\left(x+\frac{\pi}{6}\right)-\sin\left(x-\frac{\pi}{6}\right)=\frac{1}{2}$$