

7.3 Sum and Difference Identities
Honors Algebra 2 with Trig

The Sum and Difference Formulas for Cosine	$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$ $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$
The Sum and Difference Formulas for Sine	$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$ $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$
The Sum and Difference Formulas for Tangent	$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$ $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$

1. Find the exact value of each expression:

a. $\cos(120^\circ - 45^\circ)$

b. $\sin(60^\circ - 45^\circ)$

c. $\sin\left(\frac{4\pi}{3} - \frac{\pi}{4}\right)$

d. $\sin(75^\circ)$

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

f. $\tan(300^\circ - 45^\circ)$

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<p>The Sum and Difference Formulas for Sine</p>	$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$ $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$
<p>The Sum and Difference Formulas for Tangent</p>	$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$ $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$

2. Find the exact value of each expression:

a. $\cos 50^\circ + \cos 5^\circ + \sin 50^\circ \sin 5^\circ$

b. $\sin 40^\circ \cos 20^\circ + \cos 40^\circ \sin 20^\circ$

c. $\frac{\tan 50^\circ - \tan 20^\circ}{1 + \tan 50^\circ \tan 20^\circ}$

d. $\sin \frac{7\pi}{12} \cos \frac{\pi}{12} - \cos \frac{7\pi}{12} \sin \frac{\pi}{12}$

e. $\cos \frac{5\pi}{18} \cos \frac{\pi}{9} + \sin \frac{5\pi}{18} \sin \frac{\pi}{9}$

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