

# Chapter 3

## Trigonometric Identities I



**Table 3-1:** Addition formulas for the three trigonometric ratios

	Addition	Subtraction
Sine	$\sin(A + B) = \sin A \cos B + \sin B \cos A$	$\sin(A - B) = \sin A \cos B - \sin B \cos A$
Cosine	$\cos(A + B) = \cos A \cos B - \sin A \sin B$	$\cos(A - B) = \cos A \cos B + \sin A \sin B$
Tangent	$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$	$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

**Table 3-2:** Double angle formulas for the three trigonometric ratios

Function	Identities
Sine	$\sin 2A = 2 \sin A \cos A$
Cosine	$\cos 2A = \cos^2 A - \sin^2 A$ $\cos 2A = 2\cos^2 A - 1$ $\cos 2A = 1 - 2\sin^2 A$
Tangent	$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$

**Table 3-3:** Triple angle formulas for the three trigonometric ratios

Function	Identities
Sine	$\sin 3A = 3 \sin A - 4 \sin^3 A$
Cosine	$\cos 3A = 4 \cos^3 A - 3 \cos A$
Tangent	$\tan 3A = \frac{2 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$

**Table 3-4:** Half angle formulas for the three trigonometric ratios

Function	Identities
Sine	$\sin A = 2 \sin \frac{1}{2} A \cos \frac{1}{2} A$
Cosine	$\cos A = \cos^2 \frac{1}{2} A - \sin^2 \frac{1}{2} A$ $\cos A = 2 \cos^2 \frac{1}{2} A - 1$ $\cos A = 1 - 2 \sin^2 \frac{1}{2} A$
Tangent	$\tan A = \frac{2 \tan \frac{1}{2} A}{1 - \tan^2 \frac{1}{2} A}$



# Thank You

