Trigonometric Relations

$\cos\theta = \cos(-\theta) = \sin(\pi/2 - \theta)$
$\sin\theta = -\sin(-\theta) = \cos(\pi/2 - \theta)$
$\tan\theta = -\tan(-\theta) = \cot(\pi/2 - \theta)$

$\sin 2\theta = 2\cos\theta\sin\theta$
$\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$
$\tan 2\theta = 2\tan\theta / (1 - \tan^2\theta)$

$\sin\theta/2 = \pm\sqrt{[(1 - \cos\theta)/2]}$
$\cos\theta/2 = \pm\sqrt{[(1 + \cos\theta)/2]}$
$\tan\theta/2 = \sin\theta/(1 + \cos\theta)$

$\cos^2\theta + \sin^2\theta = 1$
$\sec^2\theta - \tan^2\theta = 1$
$\mathrm{cosec}^2\theta - \cot^2\theta = 1$

$\sin^2\theta = \frac{1}{2}(1 - \cos 2\theta)$
$\cos^2\theta = \frac{1}{2}(1 + \cos 2\theta)$
$\tan^2\theta = (1 - \cos 2\theta)/(1 + \cos 2\theta)$

$\sin(A + B) = \sin A\cos B + \cos A\sin B$
$\sin(A - B) = \sin A\cos B - \cos A\sin B$
$\cos(A + B) = \cos A\cos B - \sin A\sin B$
$\cos(A - B) = \cos A\cos B + \sin A\sin B$
$\tan(A + B) = (\tan A + \tan B)/(1 - \tan A\tan B)$
$\tan(A - B) = (\tan A - \tan B)/(1 + \tan A\tan B)$

$\sin A + \sin B = 2\sin\frac{1}{2}(A + B)\cos\frac{1}{2}(A - B)$
$\sin A - \sin B = 2\cos\frac{1}{2}(A + B)\sin\frac{1}{2}(A - B)$
$\cos A + \cos B = 2\cos\frac{1}{2}(A + B)\cos\frac{1}{2}(A - B)$
$\cos A - \cos B = -2\sin\frac{1}{2}(A + B)\sin\frac{1}{2}(A - B)$
$\tan A + \tan B = \sin(A + B)/(\cos A\cos B)$
$\tan A - \tan B = \sin(A - B)/(\cos A\cos B)$

$\sin^2 A + \sin^2 B = 1 - \cos(A + B)\cos(A - B)$
$\sin^2 A - \sin^2 B = \sin(A + B)\sin(A - B)$
$\cos^2 A + \sin^2 B = 1 - \sin(A + B)\sin(A - B)$
$\cos^2 A - \sin^2 B = \cos(A + B)\cos(A - B)$
$\cos^2 A + \cos^2 B = 1 + \cos(A + B)\cos(A - B)$
$\cos^2 A - \cos^2 B = -\sin(A + B)\sin(A - B)$

For a triangle with sides a, b, c, and angles A, B, C opposite sides a, b and c respectively, the following relations hold.
$a^2 = b^2 + c^2 - 2bc\cos A$
$a/\sin A = b/\sin B = c/\sin C$.
$(a - b)/(a + b) = \tan\frac{1}{2}(A - B)/\tan\frac{1}{2}(A + B)$

$$\cos^2 x+\cos^2\left(x-\frac{2\pi}{3}\right)+\cos^2\left(x+\frac{2\pi}{3}\right)=\frac{3}{2}$$
$$\sin^2 x+\sin^2\left(x-\frac{2\pi}{3}\right)+\sin^2\left(x+\frac{2\pi}{3}\right)=\frac{3}{2}$$

$$\sin x\cos x+\sin\left(x-\frac{2\pi}{3}\right)\cos\left(x-\frac{2\pi}{3}\right)+\sin\left(x+\frac{2\pi}{3}\right)\cos\left(x+\frac{2\pi}{3}\right)=0$$
$$\sin x+\sin\left(x-\frac{2\pi}{3}\right)+\sin\left(x+\frac{2\pi}{3}\right)=0$$
$$\cos x+\cos\left(x-\frac{2\pi}{3}\right)+\cos\left(x+\frac{2\pi}{3}\right)=0$$

$$\sin x\cos y+\sin\left(x-\frac{2\pi}{3}\right)\cos\left(y-\frac{2\pi}{3}\right)+\sin\left(x+\frac{2\pi}{3}\right)\cos\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\sin(x-y)$$
$$\sin x\sin y+\sin\left(x-\frac{2\pi}{3}\right)\sin\left(y-\frac{2\pi}{3}\right)+\sin\left(x+\frac{2\pi}{3}\right)\sin\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\cos(x-y)$$
$$\cos x\cos y+\cos\left(x-\frac{2\pi}{3}\right)\cos\left(y-\frac{2\pi}{3}\right)+\cos\left(x+\frac{2\pi}{3}\right)\cos\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\cos(x-y)$$

$$\sin x\cos y+\sin\left(x+\frac{2\pi}{3}\right)\cos\left(y-\frac{2\pi}{3}\right)+\sin\left(x-\frac{2\pi}{3}\right)\cos\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\sin(x+y)$$
$$\cos x\sin y+\cos\left(x+\frac{2\pi}{3}\right)\sin\left(y-\frac{2\pi}{3}\right)+\cos\left(x-\frac{2\pi}{3}\right)\sin\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\sin(x+y)$$
$$\sin x\sin y+\sin\left(x+\frac{2\pi}{3}\right)\sin\left(y-\frac{2\pi}{3}\right)+\sin\left(x-\frac{2\pi}{3}\right)\sin\left(y+\frac{2\pi}{3}\right)=-\frac{3}{2}\cos(x+y)$$
$$\cos x\cos y+\cos\left(x+\frac{2\pi}{3}\right)\cos\left(y-\frac{2\pi}{3}\right)+\cos\left(x-\frac{2\pi}{3}\right)\cos\left(y+\frac{2\pi}{3}\right)=\frac{3}{2}\cos(x+y)$$