三角函数的基本关系式

$\sin(-\alpha) = -\sin\alpha$

$\cos(-\alpha) = \cos\alpha$

$\tan(-\alpha) = -\tan\alpha$

$\cot(-\alpha) = -\cot\alpha$

$cosec\,\theta = \dfrac{1}{\sin\theta}$

$sec\theta = \dfrac{1}{\cos\theta}$

$\cot\theta = \dfrac{1}{\tan\theta}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$

$\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

三角恒等式

$sin^2\theta + cos^2\theta = 1$

$1 + tan^2\theta = sec^2\theta$

$1 + cot^2\theta = cosec^2\theta$

两角和与差的余弦

$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\tan(\alpha+\beta) = \dfrac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

$\tan(\alpha-\beta) = \dfrac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$

倍角的正弦、余弦和正切

$\sin 2\alpha = 2\sin\alpha\cos\alpha$

$\cos 2\alpha = cos^2\alpha - sin^2\alpha$

$\cos 2\alpha = 2cos^2\alpha - 1$

$\cos 2\alpha = 1 - 2sin^2\alpha$

$\tan 2\alpha = \dfrac{2\tan\alpha}{1 - tan^2\alpha}$

半角的正弦、余弦和正切

$$\sin\theta = 2\sin\frac{\theta}{2}\cos\frac{\theta}{2}$$

$$\cos\theta = 2\cos^2\frac{\theta}{2} - 1$$

$$\cos\theta = 1 - 2\sin^2\frac{\theta}{2}$$

$$\tan\theta = \frac{2\tan\frac{\theta}{2}}{1 - \tan^2\frac{\theta}{2}}$$

设 $t = \tan\frac{\alpha}{2}$

$$\sin\alpha = \frac{2t}{1 + t^2}$$

$$\cos\alpha = \frac{1 - t^2}{1 + t^2}$$

$$\tan\alpha = \frac{2t}{1 + t^2}$$

三角函数的化积和差

$$\sin\alpha\cos\beta = \frac{1}{2}[\sin(\alpha + \beta) + \sin(\alpha - \beta)]$$

$$\cos\alpha\sin\beta = \frac{1}{2}[\sin(\alpha + \beta) - \sin(\alpha - \beta)]$$

$$\cos\alpha\cos\beta = \frac{1}{2}[\cos(\alpha + \beta) + \cos(\alpha - \beta)]$$

$$\sin\alpha\sin\beta = -\frac{1}{2}[\cos(\alpha + \beta) - \cos(\alpha - \beta)]$$

三角函数的和差化积

$$\sin x + \sin y = 2\sin\frac{x + y}{2}\cos\frac{x - y}{2}$$

$$\sin x - \sin y = 2\cos\frac{x + y}{2}\sin\frac{x - y}{2}$$

$$\cos x + \cos y = 2\cos\frac{x + y}{2}\cos\frac{x - y}{2}$$

$$\cos x - \cos y = -2\sin\frac{x + y}{2}\sin\frac{x - y}{2}$$