

三角関数の公式

三角関数の合成

$$a \sin \theta + b \cos \theta = \sqrt{a^2 + b^2} (\cos \alpha \sin \theta + \sin \alpha \cos \theta)$$

$$= \sqrt{a^2 + b^2} \sin(\theta + \alpha)$$

ただし $\cos \alpha = \frac{a}{\sqrt{a^2 + b^2}}, \sin \alpha = \frac{b}{\sqrt{a^2 + b^2}}$

$$\sin^3 \alpha = \frac{3 \sin \alpha - \sin 3\alpha}{4}$$

$$\cos^3 \alpha = \frac{3 \cos \alpha - \cos 3\alpha}{4}$$

3倍角

$$\sin 3\alpha = 3 \sin \alpha - 4 \sin^3 \alpha$$

$$\cos 3\alpha = 4 \cos^3 \alpha - 3 \cos \alpha$$

半角公式

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

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

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

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

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

加法定理 (正弦)

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

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

加法定理 (余弦)

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

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

加法定理 (正接)

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

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

2倍角

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

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

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

相互関係

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

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

$$1 + \tan^2 \theta = \frac{1}{\cos^2 \theta}$$

(積) \leftrightarrow (和)

$$2 \sin \alpha \cos \beta = \sin(\alpha + \beta) - \sin(\alpha - \beta)$$

$$2 \cos \alpha \sin \beta = \sin(\alpha + \beta) - \sin(\alpha - \beta)$$

$$2 \cos \alpha \cos \beta = \cos(\alpha - \beta) + \cos(\alpha + \beta)$$

$$2 \sin \alpha \sin \beta = \cos(\alpha - \beta) - \cos(\alpha + \beta)$$