



### ← صيغ تحويل مجموع:

$$\cos(a - b) = \cos a \times \cos b + \sin a \times \sin b$$

$$\sin(a - b) = \sin a \times \cos b - \cos a \times \sin b$$

$$\tan(a - b) = \frac{\tan a - \tan b}{1 + \tan a \times \tan b}$$

$$\cos(a + b) = \cos a \times \cos b - \sin a \times \sin b$$

$$\sin(a + b) = \sin a \times \cos b + \cos a \times \sin b$$

$$\tan(a + b) = \frac{\tan a + \tan b}{1 - \tan a \times \tan b}$$

### ← نتائج:

$$t = \tan \frac{a}{2} \text{ بوضع:}$$

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

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

$$\tan a = \frac{2t}{1 - t^2}$$

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

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

$$= 1 - 2\sin^2 a$$

$$\sin 2a = 2\sin a \times \cos a$$

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

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

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

### ← تحويل مجموع إلى جداء:

$$\cos p + \cos q = 2\cos\left(\frac{p+q}{2}\right)\cos\left(\frac{p-q}{2}\right)$$

$$\cos p - \cos q = -2\sin\left(\frac{p+q}{2}\right)\sin\left(\frac{p-q}{2}\right)$$

$$\sin p + \sin q = 2\sin\left(\frac{p+q}{2}\right)\cos\left(\frac{p-q}{2}\right)$$

$$\sin p - \sin q = 2\cos\left(\frac{p+q}{2}\right)\sin\left(\frac{p-q}{2}\right)$$

$$\cos a \times \cos b = \frac{1}{2}[\cos(a + b) + \cos(a - b)]$$

$$\sin a \times \sin b = -\frac{1}{2}[\cos(a + b) - \cos(a - b)]$$

$$\sin a \times \cos b = \frac{1}{2}[\sin(a + b) - \sin(a - b)]$$

$$\cos a \times \sin b = \frac{1}{2}[\sin(a + b) + \sin(a - b)]$$

$$(a, b) \neq (0, 0)$$

### ← تحويل: $a \cos x + b \sin x$

$$a \cos x + b \sin x = \sqrt{a^2 + b^2} \left( \frac{a}{\sqrt{a^2 + b^2}} \cos x + \frac{b}{\sqrt{a^2 + b^2}} \sin x \right)$$

$$= \sqrt{a^2 + b^2} \cos(x - \alpha)$$

حيث  $\alpha$  عدد حقيقي يحقق:

$$\cos \alpha = \frac{a}{\sqrt{a^2 + b^2}}$$

و

$$\sin \alpha = \frac{b}{\sqrt{a^2 + b^2}}$$