삼각함수의 곱을 합 또는 차로 변형하는 공식

(Formulas to Transform Trigonometric Products into Sums or Differences)

Start End

Start End

$$\sin\alpha\cos\beta \quad =$$

Start End

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

Start End

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

$$\cos\alpha\sin\beta =$$

Start End

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

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

Start End

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

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$$\sin\alpha\sin\beta =$$

Start End

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

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

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

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

Home Start End

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

Home Start End

$$
\begin{aligned}
\sin(\alpha + \beta) &= \sin\alpha\cos\beta + \cos\alpha\sin\beta \\
\sin(\alpha - \beta) &= \sin\alpha\cos\beta - \cos\alpha\sin\beta
\end{aligned}
$$

Home Start End

$$\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta+\cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta-\cos\alpha\sin\beta \\
\sin(\alpha+\beta)+\sin(\alpha-\beta) &= 2\sin\alpha\cos\beta
\end{aligned}$$

Home Start End

$$\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta+\cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta-\cos\alpha\sin\beta \\
\sin(\alpha+\beta)+\sin(\alpha-\beta) &= 2\sin\alpha\cos\beta \\
2\sin\alpha\cos\beta &= \sin(\alpha+\beta)+\sin(\alpha-\beta)
\end{aligned}$$

Home Start End

$$\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta+\cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta-\cos\alpha\sin\beta \\
\sin(\alpha+\beta)+\sin(\alpha-\beta) &= 2\sin\alpha\cos\beta \\
2\sin\alpha\cos\beta &= \sin(\alpha+\beta)+\sin(\alpha-\beta) \\
\\
\therefore \sin\alpha\cos\beta &= \frac{1}{2}\{\sin(\alpha+\beta)+\sin(\alpha-\beta)\}
\end{aligned}$$

Home Start End

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

Home Start End

$$\begin{aligned}\sin(\alpha+\beta) &= \sin\alpha\cos\beta+\cos\alpha\sin\beta\\ \sin(\alpha-\beta) &= \sin\alpha\cos\beta-\cos\alpha\sin\beta\end{aligned}$$

Home Start End

$$
\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta + \cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta - \cos\alpha\sin\beta \\
\sin(\alpha+\beta) - \sin(\alpha-\beta) &= 2\cos\alpha\sin\beta
\end{aligned}
$$

Home Start End

$$\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta+\cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta-\cos\alpha\sin\beta \\
\sin(\alpha+\beta)-\sin(\alpha-\beta) &= 2\cos\alpha\sin\beta \\
2\cos\alpha\sin\beta &= \sin(\alpha+\beta)-\sin(\alpha-\beta)
\end{aligned}$$

Home Start End

$$\begin{aligned}
\sin(\alpha+\beta) &= \sin\alpha\cos\beta + \cos\alpha\sin\beta \\
\sin(\alpha-\beta) &= \sin\alpha\cos\beta - \cos\alpha\sin\beta \\
\sin(\alpha+\beta) - \sin(\alpha-\beta) &= 2\cos\alpha\sin\beta \\
2\cos\alpha\sin\beta &= \sin(\alpha+\beta) - \sin(\alpha-\beta) \\
\therefore \cos\alpha\sin\beta &= \frac{1}{2}\left\{\sin(\alpha+\beta) - \sin(\alpha-\beta)\right\}
\end{aligned}$$

Home Start End

Home Start End

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

Home Start End

$$\begin{aligned}\cos(\alpha + \beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\ \cos(\alpha - \beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta\end{aligned}$$

Home Start End

$$\begin{aligned}\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\ \cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\ \cos(\alpha+\beta)+\cos(\alpha-\beta) &= 2\cos\alpha\cos\beta\end{aligned}$$

Home Start End

$$\begin{aligned}
\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\
\cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\
\cos(\alpha+\beta)+\cos(\alpha-\beta) &= 2\cos\alpha\cos\beta \\
2\cos\alpha\cos\beta &= \cos(\alpha+\beta)+\cos(\alpha-\beta)
\end{aligned}$$

Home Start End

$$\begin{aligned}
\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\
\cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\
\cos(\alpha+\beta)+\cos(\alpha-\beta) &= 2\cos\alpha\cos\beta \\
2\cos\alpha\cos\beta &= \cos(\alpha+\beta)+\cos(\alpha-\beta) \\
\therefore \cos\alpha\cos\beta &= \frac{1}{2}\{\cos(\alpha+\beta)+\cos(\alpha-\beta)\}
\end{aligned}$$

Home Start End

Home Start End

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

Home Start End

$$\begin{aligned}\cos(\alpha+\beta) &= \cos\alpha\cos\beta-\sin\alpha\sin\beta\\ \cos(\alpha-\beta) &= \cos\alpha\cos\beta+\sin\alpha\sin\beta\end{aligned}$$

Home Start End

$$\begin{aligned}\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\ \cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\ \cos(\alpha+\beta)-\cos(\alpha-\beta) &= -2\sin\alpha\sin\beta\end{aligned}$$

Home Start End

$$\begin{aligned}
\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\
\cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\
\cos(\alpha+\beta) - \cos(\alpha-\beta) &= -2\sin\alpha\sin\beta \\
-2\sin\alpha\sin\beta &= \cos(\alpha+\beta) - \cos(\alpha-\beta)
\end{aligned}$$

Home Start End

$$
\begin{aligned}
\cos(\alpha+\beta) &= \cos\alpha\cos\beta - \sin\alpha\sin\beta \\
\cos(\alpha-\beta) &= \cos\alpha\cos\beta + \sin\alpha\sin\beta \\
\cos(\alpha+\beta) - \cos(\alpha-\beta) &= -2\sin\alpha\sin\beta \\
-2\sin\alpha\sin\beta &= \cos(\alpha+\beta) - \cos(\alpha-\beta) \\
\\
\therefore \sin\alpha\sin\beta &= -\frac{1}{2}\{\cos(\alpha+\beta) - \cos(\alpha-\beta)\}
\end{aligned}
$$

Github:
https://min7014.github.io/math20230422001.html

Click or paste URL into the URL search bar, and you can see a picture moving.