Deriving a Trig Identity

Aresh Pourkavoos

February 21, 2022

$$\cos(2ax) + \cos(2bx) = 2\cos((a+b)x)\cos((a-b)x)$$
$$\sin(2ax) + \sin(2bx) = 2\sin((a+b)x)\cos((a-b)x)$$

$$(\cos(2a) + \cos(2b)) + i(\sin(2a) + \sin(2b)) = 2\cos(a+b)\cos(a-b) + 2i\sin(a+b)\cos(a-b)$$

$$\text{cis}(2a) + \text{cis}(2b) = 2\text{cis}(a+b)\cos(a-b)$$

$$\text{cis}(2a) + \text{cis}(2b) = \text{cis}(a+b)(\text{cis}(a-b) + \text{cis}(b-a))$$