Trigonometry – Factor Formulae (1 page; 15/4/21)

$sin\theta + sin\phi = 2sinXcosY$

$sin\theta - sin\phi = 2cosXsinY$

$cos\theta + cos\phi = 2cosXcosY$

$cos\theta - cos\phi = -2sinXsinY$

where $X = \frac{1}{2}(\theta + \phi)$ & $Y = \frac{1}{2}(\theta - \phi)$

Proofs

Let $\theta = X + Y$ & $\phi = X - Y$

Then $sin\theta + sin\phi =$ sinXcosY + cosXsinY + sinXcosY − cosXsinY

$=$ 2sinXcosY , with X & Y as above; and similarly for the other formulae.