

Quantum Mechanics

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Trigonometric Identities



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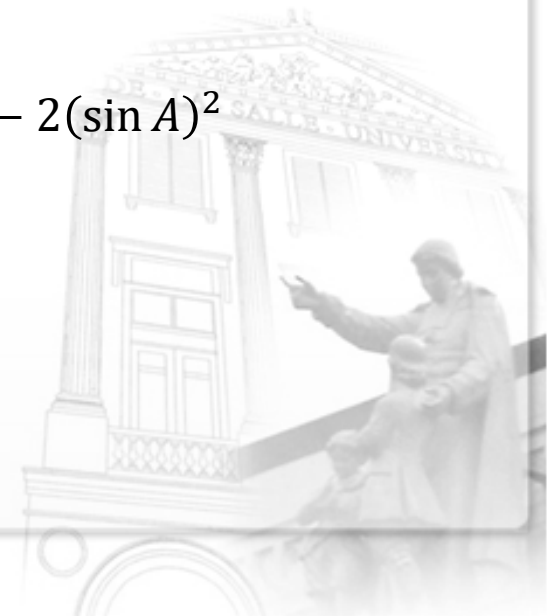
Addition Formulas

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = (\cos A)^2 - (\sin A)^2 = 2(\cos A)^2 - 1 = 1 - 2(\sin A)^2$$



Sum and Difference

$$\sin A + \sin B = 2 \sin \frac{1}{2}(A + B) \cos \frac{1}{2}(A - B)$$

$$\sin A - \sin B = 2 \cos \frac{1}{2}(A + B) \sin \frac{1}{2}(A - B)$$

$$\cos A + \cos B = 2 \cos \frac{1}{2}(A + B) \cos \frac{1}{2}(A - B)$$

$$\cos A - \cos B = 2 \sin \frac{1}{2}(A + B) \sin \frac{1}{2}(A - B)$$



Products

$$\sin A \sin B = \frac{1}{2}[\cos(A - B) - \cos(A + B)]$$

$$\cos A \cos B = \frac{1}{2}[\cos(A - B) + \cos(A + B)]$$

$$\sin A \cos B = \frac{1}{2}[\sin(A - B) + \sin(A + B)]$$



Powers of Sine

$$(\sin A)^2 = \frac{1}{2} - \frac{1}{2} \cos 2A$$

$$(\sin A)^3 = \frac{3}{4} \sin A - \frac{1}{4} \sin 3A$$

$$(\sin A)^4 = \frac{3}{8} - \frac{1}{2} \cos 2A + \frac{1}{8} \cos 4A$$

$$(\sin A)^5 = \frac{5}{8} \sin A - \frac{5}{16} \sin 3A + \frac{1}{16} \sin 5A$$



Powers of Cosine

$$(\cos A)^2 = \frac{1}{2} + \frac{1}{2} \cos 2A$$

$$(\cos A)^3 = \frac{3}{4} \cos A + \frac{1}{4} \cos 3A$$

$$(\cos A)^4 = \frac{3}{8} + \frac{1}{2} \cos 2A + \frac{1}{8} \cos 4A$$

$$(\cos A)^5 = \frac{5}{8} \cos A + \frac{5}{16} \cos 3A + \frac{1}{16} \cos 5A$$

