

making $A = B$,

$$\sin 2A = 2(\sin A \cos A)$$

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

$$\cos 2A = \cos^2 A - \sin^2 A \quad (i)$$

$$\text{but} \quad \sin^2 A + \cos^2 A = 1$$

$$\Rightarrow \quad \cos^2 A = 1 - \sin^2 A$$

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substituting for $\cos^2 A$ in (i)

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

$$\underline{\cos 2A = 1 - 2\sin^2 A}$$

substituting for $\sin^2 A$ in (i)

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

$$\cos 2A = \cos^2 A - 1 + \cos^2 A$$

$$\underline{\cos 2A = 2\cos^2 A - 1}$$

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