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## Trigonometry Identities - half angles (1)

Prove  $\frac{\sin \theta}{1 + \cos \theta} \equiv \tan \frac{\theta}{2}$

Proof:  $\frac{\sin \theta}{1 + \cos \theta} \equiv \frac{2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}}{1 + 2 \cos^2 \frac{\theta}{2} - 1}$

$$\equiv \frac{2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}}{2 \cos^2 \frac{\theta}{2}}$$
$$\equiv \frac{\sin \frac{\theta}{2}}{\cos \frac{\theta}{2}}$$
$$\equiv \tan \frac{\theta}{2}$$

$\sin 2A \equiv 2 \sin A \cos A$   
let  $2A = \theta \Rightarrow A = \frac{\theta}{2}$   
 $\therefore \sin \theta \equiv 2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}$

$\cos 2A \equiv 2 \cos^2 A - 1$   
 $\cos \theta \equiv 2 \cos^2 \frac{\theta}{2} - 1$

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