

10-3

Half Angle Identities

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$$\sin \frac{\theta}{2} = \pm \sqrt{\frac{1 - \cos \theta}{2}}$$

$$\cos \frac{\theta}{2} = \pm \sqrt{\frac{1 + \cos \theta}{2}}$$

$$\tan \frac{\theta}{2} = \pm \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}}$$

Find the exact value of $\cos 112.5^\circ$

$$112.5 = \frac{225}{2} \quad \cos 112.5 = \cos \frac{225}{2} = \pm \sqrt{\frac{1 + \cos 225}{2}}$$

$$= \pm \sqrt{\frac{1 - \sqrt{2}/2}{2}}$$

And that's good enough for this semester

You try: Find the exact value of $\tan 165^\circ$

$$165 = \frac{330}{2} \quad \tan 165 = \tan \frac{330}{2} = \pm \sqrt{\frac{1 - \cos 330}{1 + \cos 330}}$$

$$= \pm \sqrt{\frac{1 - \sqrt{3}/2}{1 + \sqrt{3}/2}}$$