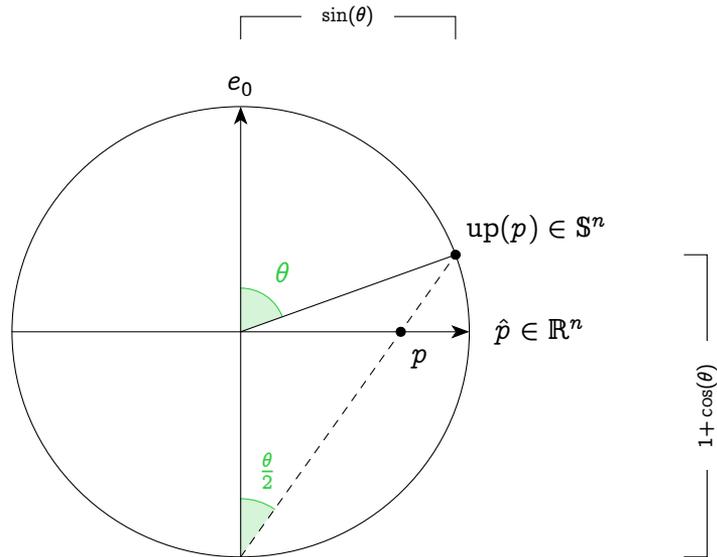# Stereographic projection identites

In one dimension:

$$\mathrm{up}(x) = \left(\frac{2x}{1+x^2}, \frac{1-x^2}{1+x^2} \right) = (\sin\theta, \cos\theta)$$

Coordinate maps:

$$\tan\theta = \frac{2x}{1-x^2} \iff \tan\frac{\theta}{2} = x$$