

## Conditions

prove

$$\sin D = \frac{2 \tan(D/2)}{1 + \tan^2(D/2)}$$

## Solution

$$\begin{aligned} \sin(D) &= 2 \sin\left(\frac{D}{2}\right) \cos\left(\frac{D}{2}\right) = 2 \tan\left(\frac{D}{2}\right) \cos^2\left(\frac{D}{2}\right) = \frac{2 \tan\left(\frac{D}{2}\right) \cos^2\left(\frac{D}{2}\right)}{\cos^2\left(\frac{D}{2}\right) + \sin^2\left(\frac{D}{2}\right)} = \\ &= \frac{2 \tan\left(\frac{D}{2}\right)}{\frac{\cos^2\left(\frac{D}{2}\right) + \sin^2\left(\frac{D}{2}\right)}{\cos^2\left(\frac{D}{2}\right)}} = \frac{2 \tan\left(\frac{D}{2}\right)}{1 + \tan^2\left(\frac{D}{2}\right)} \end{aligned}$$