

$$\sin(x) = \frac{2tg(\frac{x}{2})}{1+tg^2(\frac{x}{2})}$$

Доказательство:

$$\frac{2tg(\frac{x}{2})}{1+tg^2(\frac{x}{2})} = \frac{2sin(\frac{x}{2})}{cos(\frac{x}{2})} \frac{cos^2(\frac{x}{2})}{(cos^2(\frac{x}{2})+sin^2(\frac{x}{2}))} = \frac{2sin(\frac{x}{2})cos(\frac{x}{2})}{1} = \sin(x)$$

$$\cos(x) = \frac{1-tg^2(\frac{x}{2})}{1+tg^2(\frac{x}{2})}$$

Доказательство:

$$\frac{1-tg^2(\frac{x}{2})}{1+tg^2(\frac{x}{2})} = \frac{(cos^2(\frac{x}{2})-sin^2(\frac{x}{2}))}{cos^2(\frac{x}{2})} \frac{cos^2(\frac{x}{2})}{(cos^2(\frac{x}{2})+sin^2(\frac{x}{2}))} = \frac{cos^2(\frac{x}{2})-sin^2(\frac{x}{2})}{1} = \cos(x)$$

$$tg(x) = \frac{2tg(\frac{x}{2})}{1-tg^2(\frac{x}{2})}$$

Доказательство:

$$\frac{2tg(\frac{x}{2})}{1-tg^2(\frac{x}{2})} = \frac{2sin(\frac{x}{2})}{cos(\frac{x}{2})} \frac{cos^2(\frac{x}{2})}{(cos^2(\frac{x}{2})-sin^2(\frac{x}{2}))} = \frac{2sin(\frac{x}{2})cos(\frac{x}{2})}{cos^2(\frac{x}{2})-sin^2(\frac{x}{2})} = tg(x)$$