

## 4.13 Half Angle Tangent Identities

$$430. \quad \sin \alpha = \frac{2 \tan \frac{\alpha}{2}}{1 + \tan^2 \frac{\alpha}{2}}$$

$$431. \quad \cos \alpha = \frac{1 - \tan^2 \frac{\alpha}{2}}{1 + \tan^2 \frac{\alpha}{2}}$$

$$432. \quad \tan \alpha = \frac{2 \tan \frac{\alpha}{2}}{1 - \tan^2 \frac{\alpha}{2}}$$

$$433. \quad \cot \alpha = \frac{1 - \tan^2 \frac{\alpha}{2}}{2 \tan \frac{\alpha}{2}}$$