

$$\begin{aligned}
 & \int t^{\alpha} \sqrt{1+t^2}^{\beta} dt \\
 &= \int (\tan \theta)^{\alpha} (\sec \theta)^{\beta} (\sec \theta)^2 d\theta \\
 &= \int (\tan \theta)^{\alpha} (\sec \theta)^{\beta+2} d\theta \\
 &= \int \frac{(\sin \theta)^{\alpha}}{(\cos \theta)^{\alpha}} \frac{1}{(\cos \theta)^{\beta+2}} d\theta \\
 &= \int (\sin \theta)^{\alpha} (\cos \theta)^{-\alpha-\beta-2} d\theta
 \end{aligned}$$

$$\left[\begin{aligned} t &= \tan \theta \\ \sqrt{1+t^2} &= \sec \theta \\ dt &= (\sec \theta)^2 d\theta \end{aligned} \right]$$