$$\Rightarrow I = \frac{1}{2}(\sec t \tan t + \ln|\sec t + \tan t|) + C$$
$$= \frac{1}{2}(x\sqrt{1+x^2} + \ln(x+\sqrt{1+x^2})) + C$$

 $= \sec t \tan t - I + \ln|\sec t + \tan t| + C$