

5.5.37

$$\int \frac{x}{\sqrt{1+x}} dx = ?$$

Solution

Well,  $\int \frac{x}{\sqrt{1+x}} dx$  let  $u = 1+x \Rightarrow x = u-1$   
 $du = dx$

$$= \int \frac{u-1}{\sqrt{u}} du = \int \frac{u-1}{u^{1/2}} du$$

$$= \int \left( \frac{u}{u^{1/2}} - \frac{1}{u^{1/2}} \right) du = \int (u^{1/2} - u^{-1/2}) du$$

$$= \frac{2}{3} u^{3/2} - (2u^{1/2}) + C$$

$$= \left[ \frac{2}{3} (1+x)^{3/2} - 2(1+x)^{1/2} + C \right]. \quad \square$$