$$\int \frac{x}{\sqrt{1-x^2}}\,dx$$

Solution

Apply substitution with $u = 1 - x^2$, so $du = -2x\,dx$, thus

$$\int \frac{x}{\sqrt{1-x^2}}\,dx = -\frac{1}{2}\int u^{-1/2}\,du = -\frac{1}{2}\frac{u^{1/2}}{\frac{1}{2}} + C = -\sqrt{u} + C = -\sqrt{1-x^2} + C.$$