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

Solution

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

$$\int \frac{x}{1+x^2}\,dx = \frac{1}{2}\int \frac{1}{u}\,du = \frac{1}{2}\ln|u| + C = \frac{1}{2}\ln|1+x^2| + C.$$