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

## Solution

The denominator of this fraction won't factor nicely, so there is no need to bother with partial fractions. Instead, let's complete the square in the denominator:

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

Let $u = x+1$. Then $du = dx$. So, the integral above is equal to

$$\begin{aligned}\int \frac{1}{u^2+1}\,du &= \tan^{-1}(u) + C \\ &= \tan^{-1}(x+1) + C.\end{aligned}$$