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問 (1), (2) より

$$
\begin{aligned}
I &= \int \frac{1}{x-1}dx - \int \frac{x+2}{x^2+2x+2}dx \\
&= \log|x-1| - \frac{1}{2}\log|x^2+2x+2| \\
&+ \tan^{-1}(x+1) - 2\int \frac{dx}{x^2+2x+2} + C
\end{aligned}
$$

$$
\begin{aligned}
&= \log|x-1| - \frac{1}{2}\log|x^2+2x+2| \\
&- \tan^{-1}(x+1) + C
\end{aligned}
$$