QUESTION Find $\int \dfrac{dx}{2x^2 + 4x + 3}$.

ANSWER

$$\int \frac{dx}{2x^2 + 4x + 3} = \int \frac{dx}{2(x^2 + 2x) + 3} = \int \frac{dx}{2(x + 1)^2 + 1}$$

$u = \sqrt{2}(x + 1), \ du = \sqrt{2}dx.$

Therefore $I = \displaystyle\int \frac{\frac{1}{\sqrt{2}}du}{u^2 + 1} = \frac{1}{\sqrt{2}} \tan^{-1} u + c = \frac{1}{\sqrt{2}} \tan^{-1}\{\sqrt{2}(x + 1)\} + c$