

Recall that $D_x(\arctan u) = \frac{1}{u^2+1} \times \frac{du}{dx}$.

$$\begin{aligned} \int \frac{1}{t^2-t+2} dt &= \int \frac{1}{t^2-t+\frac{1}{4}+\frac{7}{4}} dt = \int \frac{1}{(t-\frac{1}{2})^2+\frac{7}{4}} dt \\ &= \int \frac{\frac{4}{7}}{\frac{7}{4}(t-\frac{1}{2})^2+1} dt \\ &= \frac{\sqrt{7}}{2} \frac{4}{7} \arctan\left(\frac{2}{\sqrt{7}}(t-\frac{1}{2})\right) + c = \frac{2\sqrt{7}}{7} \arctan\left(\frac{2}{\sqrt{7}}(t-\frac{1}{2})\right) + c \end{aligned}$$