$$\int e^{-2x} \sin 2x \, \mathrm{d}x$$

$$\frac{1}{2} \int e^{-t} \sin t \, \mathrm{d}t$$

$$\frac{1}{2} \int e^{-t} \operatorname{Im}(e^{it})$$

$$\frac{1}{2} \int \operatorname{Im}(e^{-t} e^{it})$$

$$\frac{1}{2} \operatorname{Im} \left(\int e^{t(i-1)} \right)$$

$$\frac{1}{2} \cdot e^{-t} \operatorname{Im} \left(\frac{e^{it}}{i-1} \right)$$

$$\frac{1}{2} \cdot e^{-t} \operatorname{Im} \left(\frac{\cos t + i \sin t}{i-1} \right)$$

$$\frac{1}{2} \cdot e^{-t} \operatorname{Im} \left(\frac{\cos t - \sin t}{-2} + i \frac{\cos t + \sin t}{-2} \right) + C$$

$$\frac{1}{2} \cdot e^{-t} \frac{\cos t + \sin t}{-2} + C$$

$$\implies \frac{e^{-2x}(\cos 2x + \sin 2x)}{-4} + C$$

Response

(test)