

1. Q — $\int te^{-3t} dt$

A —

Let $u = t; v' = e^{-3t}$. Therefore $v = -\frac{1}{3}e^{-3t}$

According to integration by parts:

$$\int uv' = uv - \int vu'$$

$$\text{Therefore } \int te^{-3t} dt = -t\frac{1}{3}e^{-3t} - \int -\frac{1}{3}e^{-3t} dx$$

$$= -\frac{t}{3}e^{-3t} + \frac{1}{3} \int e^{-3t} dx$$

$$= -\frac{t}{3}e^{-3t} - \frac{1}{9}e^{-3t} + C$$