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1.2 Exercises

Solve the initial value problem,

4a) $y' = -xe^x$, $y(0) = 1$ → mean that $x = 0$ $y = 1$

$dx \cdot \frac{dy}{dx} = -xe^x \cdot dx$

$\int dy = \int xe^x dx$ ←

Note: use integrate by parts →

$\int u\,dv = uv - \int v\,du$

$u = x \quad dv = e^x$

$du = 1 \quad v = e^x$

$xe^x - \int e^x \cdot 1\,dx$

$= xe^x - e^x$

$y = -(xe^x - e^x)$

$y = e^x - xe^x + C$

$\boxed{y = e^x(1-x) + C}$

Find C:

$x = 0 \quad y = 1$

$1 = e^0(1-0) + C$

$1 = 1(1) + C$

$1 = 1 + C$

$-1 \quad -1$

$\boxed{0 = C}$

Plug in

Answer:

$\boxed{y = e^x(1-x)}$