integrate. If it doesn't turn out to be simpler, we know that we are on the wrong track and we have to switch the notations of the functions.

Let x = u and e^{-x} = dv.

Then, du = 1, and, $v = \int e^{-x}\,dx = -e^{-x}$

Now, applying the above formula, we have,

$$\int xe^{-x} = x(-e^{-x}) - \int (-e^{-x})(1)\,dx$$

Notice that the new integration we have made on the right-hand side is a simpler one, compared to the original one on the left. Now simplifying, we have,

$$= x(-e^{-x}) - \int (-e^{-x})(1)\,dx$$

$$= -xe^{-x} - \left(-\int e^{-x}dx\right)$$

$$= -xe^{-x} + \int e^{-x}dx$$

$$= -xe^{-x} + (-e^{-x})$$

$= -xe^{-x} - e^{-x} + C$ (This is the final answer)

Now, what would happen if we try to switch the notations? Let's see....

Let e^{-x} = u and x = dv.

Then, du = -e^{-x} and $v = \int x\,dx = \frac{x^2}{2}$

Now, applying the above formula, we have,

$$\int xe^{-x} = (e^{-x})\left(\frac{x^2}{2}\right) - \int \left(\frac{x^2}{2}\right)(-e^{-x})\,dx$$

Now, we can see that the new integration we haven the right-hand side, " $\int \left(\frac{x^2}{2}\right)(-e^{-x})\,dx$ ", is more complex than the original integration we had, " $\int xe^{-x}$ ". This is a red flag, signaling that the notations need to be switched.