Problem Set 0

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This Problem Set will endeavor to integrate $\int xe^{-x}dx$ through integration by parts.

1 Integration

First, we choose a u and dv for the IBP formula, $\int udv = uv - \int vdu$.
We will set the u, v, du, and dv components below:

$$\begin{aligned} u &= x \\ dv &= e^{-x} \\ du &= dx \\ v &= -e^{-x} \end{aligned}$$

Plugging these into the IBP formula, we have:

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

which becomes:

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

Thus, we have evaluated the integral through integration by parts to be:

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