

$$I_{96} = \int u e^{au} \, du$$

$$\text{Integrate by parts } \begin{cases} (u)' = 1 \\ e^{au} = \left(\frac{e^{au}}{a}\right)' \end{cases}$$

$$= (u) \left(\frac{e^{au}}{a}\right) - \int (1) \left(\frac{e^{au}}{a}\right) du$$

$$= \frac{1}{a} u e^{au} - \frac{1}{a} \int e^{au} \, du$$

$$= \frac{1}{a} u e^{au} - \frac{1}{a^2} e^{au} + C$$

$$= \left(\frac{1}{a} u - \frac{1}{a^2}\right) e^{au} + C$$

Simplify

$$= \frac{1}{a^2} (au - 1) e^{au} + C$$

$$\int u e^{au} \, du = \frac{1}{a^2} (au - 1) e^{au} + C$$