

1. Übung:  $\int x \cdot e^x dx$

Rezept:  $\int u \cdot v' = u \cdot v - \int u' \cdot v$

$$u(x) = x \\ u'(x) = 1$$

$$v'(x) = e^x \\ v(x) = e^x$$

$$\begin{aligned} \int \underbrace{x}_{u} \cdot \underbrace{e^x}_{v'} dx &= x \cdot e^x - \int 1 \cdot e^x dx \\ &= x \cdot e^x - 1 \cdot e^x = \underline{(x-1) \cdot e^x} = e^x \cdot (x-1) \end{aligned}$$

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2. Übung:  $\int x \cdot e^{2x} dx$

$$u(x) = x \\ u'(x) = 1$$

$$v(x) = \frac{1}{2} e^{2x} \\ v'(x) = e^{2x}$$

$$\begin{aligned} &= \left[ \underbrace{x}_{u} \cdot \underbrace{\frac{1}{2} e^{2x}}_v \right] - \int \underbrace{1}_{u'} \cdot \underbrace{\frac{1}{2} e^{2x}}_v dx = \left[ x \cdot \frac{1}{2} e^{2x} \right] - \left[ \frac{1}{4} e^{2x} \right] \\ &= \left[ \frac{x}{2} - \frac{1}{4} \right] \cdot e^{2x} \end{aligned}$$