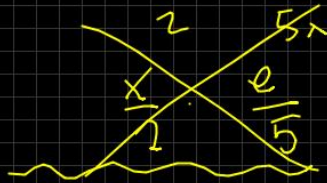


L 16 Partiell integration (motsv. till produktregel)

Ex. 1) Beräkna $\int x \cdot e^{5x} dx =$



Produktregel: Låt F vara primitiv funktion till f .

$$\begin{aligned} (F(x) \cdot g(x))' &= F'(x) \cdot g(x) + F(x) \cdot g'(x) = \\ &= f(x) \cdot g(x) + F(x) \cdot g'(x) \end{aligned}$$

$$\int (F(x) \cdot g(x))' dx = \int (F'(x) \cdot g(x) + F(x) \cdot g'(x)) dx$$

$$= \int f(x) \cdot g(x) dx + \int F(x) \cdot g'(x) dx$$

$$\int f(x) \cdot g(x) dx = F(x) \cdot g(x) - \int F(x) \cdot g'(x) dx \quad , \text{partielle Integr.}$$

Ex. 1) Berechnen

$$\int \underset{\substack{\uparrow \\ f}}{x} \cdot \underset{\substack{\uparrow \\ g}}{e^{5x}} dx = \frac{e^{5x}}{5} \cdot x - \int \frac{e^{5x}}{5} \cdot 1 dx =$$
$$= \frac{x e^{5x}}{5} - \frac{e^{5x}}{25} + C$$
$$= \frac{e^{5x}}{5} \left(x - \frac{1}{5} \right) + C$$

$$\int f(x) \cdot g(x) dx = F(x) \cdot g(x) - \int F(x) \cdot g'(x) dx$$

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$$\textcircled{2.32} \text{ a) } \int \underset{g}{x} \cdot \underset{f}{\cos x} dx = \sin x \cdot x - \int \sin x \cdot 1 dx$$

$$= x \sin x - (-\cos x) + C$$

$$= x \sin x + \cos x + C$$

$$\text{b) } \int \underset{g}{x} \cdot \underbrace{(\sin x - e^x)}_f dx = (-\cos x - e^x) \cdot x - \int (-\cos x - e^x) \cdot 1 dx =$$

$$= -x(\cos x + e^x) + \sin x + e^x + C$$

