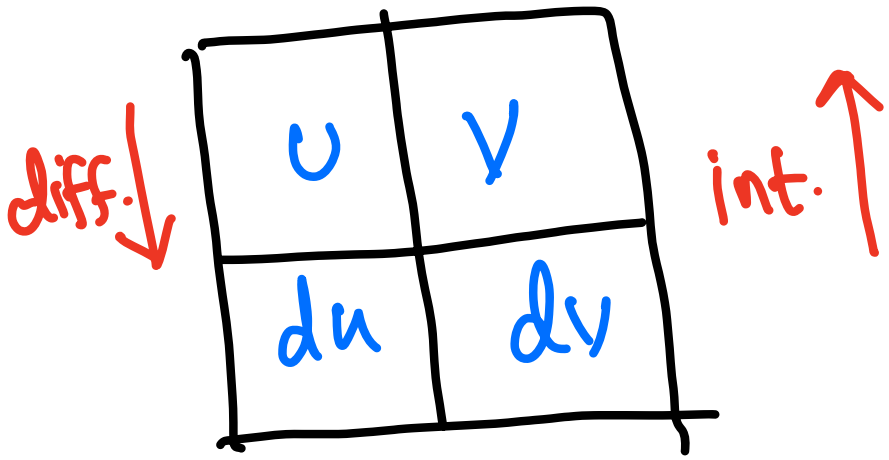
Integration By Parts

$$\int u \cdot dv = u \cdot v - \int v \cdot du$$

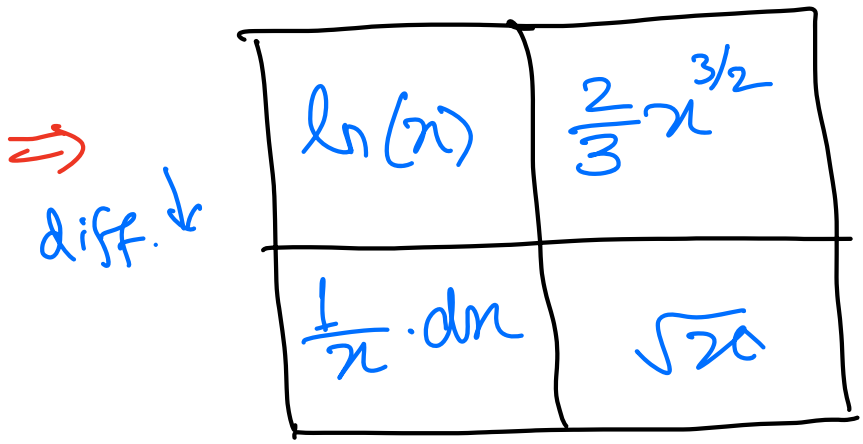


Example

$$\int \ln(x) \cdot \sqrt{x} \, dx$$

solve ?

u $\quad$ dv.



$$\Rightarrow \int \ln(x) \cdot \sqrt{x} \cdot dx$$

$$u = \ln(x) \qquad v = \frac{2}{3}(x^{3/2})$$

$$= \ln(x) \cdot \frac{2}{3}(x^{3/2}) - \int \frac{2}{3} x^{3/2} \cdot \frac{1}{x} \cdot dx$$

$$\int v \cdot \qquad du$$

$$\Rightarrow \frac{2}{3}\sqrt{x^3} \cdot \ln(x) - \frac{2}{3}\int x^{1/2} \cdot dx$$

$$= \frac{2}{3}\sqrt{x^3} \cdot \ln(x) - \frac{4}{9} x^{3/2} + C$$

or

$$\Rightarrow \boxed{\frac{2}{3}\sqrt{x^3} \cdot \ln(x) - \frac{4}{9}\sqrt{x^3}}$$

Problem Solve $\int_0^2 x \cdot e^x \cdot dx$

	x u	e^x v
diff. ↓	1 du	e^x dv

↑ int.

$$\Rightarrow \quad x \cdot e^x - \int e^x \cdot 1$$

$$\Rightarrow \quad e^x \cdot (x-1) \Big]_0^2$$

$$\left[e^2(2-1)\right] - \left[e^0(0-1)\right]$$

$$\Downarrow$$

$$7.389 - (-1) = \boxed{8.389}$$