INTEGRAÇÃO POR PARTES

$$\boxed{\int u\,dv = u \cdot v - \int v\,du}$$

1º $\int e^x \cos x \, dx$

$u = e^x \qquad v = \text{sen } x$

$du = e^x \, dx \qquad dv = \cos x$

$$\int u\,dv = e^x \cdot \text{sen } x - \int \text{sen } x \cdot e^x \quad (1)$$

• Vamos usar partes em $\int \text{sen } x \cdot e^x \, dx$:

$u = e^x \qquad v = -\cos x$

$du = e^x \, dx \qquad dv = \text{sen } x$

$$\int e^x \, \text{sen } x \, dx = -e^x \cdot \cos x + \int e^x \cdot \cos x \, dx \quad (2)$$

• Substituindo (2) em (1), temos que:

$$\int e^x \cdot \cos x \, dx = e^x \cdot \text{sen } x + e^x \cdot \cos x - \int e^x \cdot \cos x \, dx$$

$$2 \int e^x \cdot \cos x \, dx = e^x \cdot \text{sen } x + e^x \cdot \cos x$$

$$2 \int e^x \cdot \cos x \, dx = e^x (\text{sen } x + \cos x) + C$$

$$\int e^x \cdot \cos x \, dx = \frac{e^x (\text{sen } x + \cos x)}{2} + C$$

2º $\int x^2 \cdot e^x \, dx$

· Método Tabular:

$$\int \underbrace{x^2}_{f(x)} \underbrace{e^x}_{g(x)} \, dx$$

$f(x)$ e suas derivadas		$g(x)$ e suas derivadas
x^2	$+$	e^x
$2x$	$-$	e^x
2	$+$	e^x
0		e^x

$$\boxed{x^2 e^x - 2x e^x + 2e^x} + C$$

3: $\int x \cdot e^x \, dx$ $\quad u = x \quad v = e^x$

$du = 1 \quad dv = e^x$

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

$$= x \cdot e^x - \int e^x$$

$$= x \cdot e^x - e^x + C$$

4: $\int x^2 \cdot e^x \, dx$ $\quad u = x^2 \quad v = e^x$

$du = 2x \, dx \quad dv = e^x$

$$\int u \, dv = x^2 \cdot e^x - \int e^x \, 2x \, dx$$

$$= x^2 \cdot e^x - 2 \underbrace{\int e^x \cdot x \, dx}_{} \quad (1)$$

↳ TERIA QUE USAR INTEGRAIS POR PARTES AQUI

$$= x^2 \cdot e^x - 2(x \cdot e^x - e^x + C)$$

$$= x^2 e^x - 2xe^x - 2e^x + C$$

$$5: \int x \cdot \frac{\cos x}{3} \, dx = \frac{1}{3} \int x \cos x \, dx$$

$$u = x \qquad v = \operatorname{sen} x$$

$$du = 1 \qquad dv = \cos x$$

$$\int u \, dv = uv - \int v \, du$$

$$= x \cdot \operatorname{sen} x - \int \operatorname{sen} x \cdot 1$$

$$= x \cdot \operatorname{sen} x - (-\cos x)$$

$$= x \cdot \operatorname{sen} x + \cos x$$

$$= \frac{1}{3} \left(x \cdot \operatorname{sen} x + \cos x \right) + C$$

$$v = 2\sqrt{x}$$

$$6^{\circ}\ \int \frac{\ln x}{\sqrt{x}}\,dx = \int \ln x \cdot x^{-\frac{1}{2}}$$

$$u = \ln x \qquad v = 2\sqrt{x}$$

$$du = \frac{1}{x} \qquad dv = x^{-\frac{1}{2}}$$

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

$$= \ln x \cdot 2\sqrt{x} - \int \frac{2\sqrt{x}}{x}$$

$$= \ln x \cdot 2\sqrt{x} - 2\int \frac{\sqrt{x}}{x}$$

$$= \ln x \cdot 2\sqrt{x} - 2\int x^{-\frac{1}{2}}$$

$$= \ln x \cdot 2\sqrt{x} - 2\left(2\sqrt{x} + C\right)$$

$$= \ln x \cdot 2\sqrt{x} - 4\sqrt{x} + C$$

7º $\displaystyle\int_{\pi}^{5\pi} x \cdot \operatorname{sen}^2 x \, dx$ $\qquad u = x \qquad v = \int \operatorname{sen}^2 x \, dx = \frac{1}{2}x - \frac{1}{4}\operatorname{sen} 2x$

$\qquad du = dx \qquad dv = \operatorname{sen}^2 x$

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

$$= x \cdot \left(\frac{x}{2} - \frac{\operatorname{sen} 2x}{4}\right) - \left(\int \frac{1}{2}x - \frac{1}{4}\operatorname{sen} 2x \, dx\right)$$

$$= x \left(\frac{x}{2} - \frac{\operatorname{sen} 2x}{4}\right) - \frac{1}{2}\int x\,dx + \frac{1}{4}\int \operatorname{sen} 2x \, dx$$

$$= x \left(\frac{x}{2} - \frac{\operatorname{sen} 2x}{4}\right) - \frac{1x^2}{4} + \frac{(-\cos 2x)}{8}$$

$$= \left[\frac{x^2}{2} - \frac{x \cdot \operatorname{sen} 2x}{4} - \frac{x^2}{4} - \frac{\cos 2x}{8}\right]_{\pi}^{5\pi}$$

$$\left(\frac{(5\pi)^2}{2} - \frac{5\pi \cdot \operatorname{sen} 10\pi}{4} - (5\pi)^2 - \frac{\cos 2 \cdot 5\pi}{8}\right)$$

$$-$$

$$\left(\frac{\pi^2}{2} - \frac{\pi \cdot \operatorname{sen} 2 \cdot \pi}{4} - \frac{\pi^2}{4} - \frac{\cos 2\pi}{8}\right)$$

* Basta resolver normalmente e no final faz $F(b) - F(a)$.