$\frac{u'}{u} \longrightarrow \ln|u| + C.$

Exo2:

1 - $\int_0^1 \arctan x \, dx = ?$

$u = \arctan x \qquad u' = \frac{1}{1+x^2}$

$dV = 1 \qquad V = x.$

$I_1 = \int_0^1 \arctan x \cdot dx = x \arctan x \Big|_0^1 - \int_0^1 \frac{x}{1+x^2} dx.$

$= x \arctan x \Big|_0^1 - \frac{1}{2} \int_0^1 \frac{2x}{1+x^2} dx$ ($\frac{u'}{u}$)

$= x \arctan x \Big|_0^1 - \frac{1}{2} \ln|1+x^2| \Big|_0^1$

$= [\arctan(1) - 0] - \frac{1}{2}[\ln(1+1) - \ln(1+0)]$

$$\boxed{I_1 = \frac{\pi}{4} - \frac{1}{2}\ln(2)}$$

2 - $I_2 = \int e^x \cos x \, dx = ?$

$u = e^x \qquad du = e^x$

$dV = \cos x \qquad V = \sin x$

$\Big\} I = e^x \sin x - \underbrace{\int e^x \sin x \, dx}_{G}$

$G = \int e^x \sin x \, dx.$

$u = e^x \qquad du = e^x$

$dV = \sin x \qquad V = -\cos x \, dx$

$\Big\} G = -e^x \cos x + \int e^x \cos x \, dx.$

$\int e^x \cos x \, dx = e^x \sin x + e^x \cos x - \int e^x \cos x \, dx.$

$2 \int e^x \cos x \, dx = e^x \sin x + e^x \cos x + C$