PARTIAL INTEGRATION

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

In the integral we select "something" to be ***u*** , and "something" to be ***dv***.

$$\left| \begin{array}{ll} \Theta = u & \Delta dx = dv \\ \Theta` dx = du & \int \Delta dx = v \end{array} \right|$$

We divided this type of integrals into 4 groups:

1. **GROUP** Here we choose x (or phrase associated with x) to be ***u***, and all the rest is ***dv***

Examples: $\int x\cos x dx$, $\int (1-x)\sin x dx$, $\int xe^x dx$, $\int \frac{x}{\sin^2 x} dx$, $\int (x^2 - 2x + 5)e^{-x} dx$

2. **GROUP** We does not take x for ***u*** , but the term next to x, for example lnx=u,

arcsinx=u,arctgx=u……. and all the rest is ***dv***

Examples: $\int x\ln x dx$, $\int x\arcsin x dx$, $\int x^2 arctgx dx$, $\int x^3 \ln x dx$

3 **GROUP** Here we take ***dx = dv***, and internal functions is ***u*** , as in the 2 . group, lnx=u ,

arcsinx=u,arctgx=u…….

Examples: $\int \ln x dx$, $\int \ln^2 x dx$, $\int arctgx dx$, $\int \arcsin x dx$

4 **GROUP** These are circular integrals, which always have "comrade " which back integral to the beginning…

Examples: $\int e^x \sin x dx$, $\int e^x \cos x dx$, $\int \sin(\ln x) dx$, $\int \cos(\ln x) dx$

Serious examples: $\int \frac{\arcsin x}{x^2} dx$, $\int \ln(x + \sqrt{1+x^2}) dx$, $\int \frac{x\ln x}{(1+x^2)^2} dx$, $\int arctg(1+\sqrt{x}) dx$, $\int \frac{xe^x}{(e^x - 1)^3} dx$