Integration By Parts April 20, 2021

 $1 \mid \int \ln x dx$

$$\int \ln x dx = \int 1 \ln x dx$$

$$= x \ln x - \int x \frac{1}{x} dx$$

$$= x \ln x - \int 1 dx$$

$$= x \ln x - x$$

 $2 \mid \int \tan^- x dx$

$$\int \tan^{-} x dx = x \tan^{-} x - \int x \frac{1}{x^{2} + 1} dx$$

$$= x \tan^{-} x - \frac{1}{2} \int \frac{du}{u}$$

$$= x \tan^{-} x \frac{1}{2} \ln u + C \qquad = x \tan^{-} x \frac{1}{2} \ln(x^{2} + 1) + C$$

 $3 \mid \int x \sec^2 x dx$

$$\int x \sec^2 x dx = x \tan x - \int \tan x dx$$
$$= x \tan x + \ln|\cos x| + C$$

 $4 \mid \int x^2 e^{5x} dx$

$$\int x^2 e^{5x} dx = x^2 \frac{1}{5} e^{5x} - \int 2x \frac{1}{5} e^{5x} dx$$

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