CPU

Calle Mercado # 555
Teléfono 3 -366191

Integrales Trigonométricas

$$\int \text{sen}^{par}\ x\ dx \Rightarrow \text{sen}^2\ x = \frac{1-\cos 2x}{2}$$

$$\int \cos^{par}\ x\ dx \Rightarrow \cos^2 x = \frac{1+\cos 2x}{2}$$

$$\int \text{sen}^{impar}\ x\ dx = \int \text{sen}^{par}\ x \cdot \text{sen}\ x\ dx \Rightarrow \begin{cases} \text{sen}^2\ x = 1-\cos^2 x \\ u = \cos x \\ -du = \text{sen}\ x\ dx \end{cases}$$

$$\int \cos^{impar}\ x\ dx = \int \cos^{par}\ x \cdot \cos x\ dx \Rightarrow \begin{cases} \cos^2 x = 1-\text{sen}^2\ x \\ u = \text{sen}\ x \\ du = \cos x\ dx \end{cases}$$

$$\int \tan^{par}\ x\ dx = \int \tan^{2n} x \cdot \tan^2 x\ dx = \int \tan^{2n} x \cdot \left(\sec^2 x - 1\right)\ dx$$

$$= \underbrace{\int \tan^{2n} x \cdot \sec^2 x\ dx}_{\substack{u=\tan x \\ du=\sec^2 x\ dx}} - \int \tan^{2n} x\ dx$$

$$\int \cot^{par}\ x\ dx = \int \cot^{2n} x \cdot \cot^2 x\ dx = \int \cot^{2n} x \cdot \left(\csc^2 x - 1\right)\ dx$$

$$= \underbrace{\int \cot^{2n} x \cdot \csc^2 x\ dx}_{\substack{u=\cot x \\ du=-\csc^2 x\ dx}} - \int \cot^{2n} x\ dx$$

$$\int \tan^{impar}\ x\ dx = \int \tan^{2n} x \cdot \tan x\ dx = \underbrace{\int \left(\sec^2 x - 1\right)^n \cdot \tan x\ dx}_{\substack{u=\sec x \\ du=\sec x \cdot \tan x\ dx}}$$

$$\int \cot^{impar}\ x\ dx = \int \cot^{2n} x \cdot \cot x\ dx = \underbrace{\int \left(\csc^2 x - 1\right)^n \cdot \cot x\ dx}_{\substack{u=\csc x \\ du=-\csc x \cdot \cot x\ dx}}$$

$$\int \sec^{impar}\ x\ dx = \int \underbrace{\sec^n x}_{u} \cdot \underbrace{\sec^2 x\ dx}_{dv} \Rightarrow \text{integrar por partes}$$

$$\int \csc^{impar}\ x\ dx = \int \underbrace{\csc^n x}_{u} \cdot \underbrace{\csc^2 x\ dx}_{dv} \Rightarrow \text{integrar por partes}$$

$$\int \sec^{par}\ x\ dx = \int \sec^{2n} x \cdot \sec^2 x\ dx = \underbrace{\int \left(1+\tan^2 x\right)^n \cdot \sec^2 x\ dx}_{u=\tan x\ \wedge\ du=\sec^2 x\ dx}$$

$$\int \csc^{par}\ x\ dx = \int \csc^{2n} x \cdot \sec^2 x\ dx = \underbrace{\int \left(1+\cot^2 x\right)^n \cdot \csc^2 x\ dx}_{u=\cot x\ \wedge\ du=-\csc^2 x\ dx}$$

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$$\int \left(\text{sen}^{par}\ x\right) \cdot \left(\cos^{impar}\ x\right)\ dx \Rightarrow \begin{cases} u = \text{sen}\ x \\ du = \cos x\ dx \\ \cos^2 x = 1-\text{sen}^2\ x \end{cases}$$

$$\int \left(\text{sen}^{impar}\ x\right) \cdot \left(\cos^{par}\ x\right)\ dx \Rightarrow \begin{cases} u = \cos x \\ -du = \text{sen}\ x\ dx \\ \text{sen}^2\ x = 1-\cos^2 x \end{cases}$$

$$\int \left(\text{sen}^{impar}\ x\right) \cdot \left(\cos^{impar}\ x\right)\ dx \Rightarrow \textit{Cualquiera}$$

$$\int \left(\text{sen}^{par}\ x\right) \cdot \left(\cos^{par}\ x\right)\ dx \Rightarrow \begin{cases} \text{sen}^2\ x = \dfrac{1-\cos 2x}{2} \\ \cos^2 x = \dfrac{1+\cos 2x}{2} \end{cases}$$

$$\left.\begin{array}{l} \int \cot^{impar} x \cdot \csc^{par} x\ dx \\ \int \cot^{par} x \cdot \csc^{par} x\ dx \end{array}\right\} \Rightarrow \begin{cases} u = \cot x \\ du = -\csc^2 x\ dx \\ \csc^2 x = \cot^2 x + 1 \end{cases}$$

$$\int \cot^{impar} x \cdot \csc^{impar} x\ dx \Rightarrow \begin{cases} u = \csc x \\ du = -\csc x \cdot \cot x\ dx \end{cases}$$

$$\int \cot^{par} x \cdot \csc^{par} x\ dx \Rightarrow \begin{cases} \cot^2 x = \csc^2 x - 1 \\ \textit{Integrar por partes} \end{cases}$$

alternativo

$$\text{cuando "}\cot^{impar} x\text{"} \Rightarrow \begin{cases} \cot x = \dfrac{\cos x}{\text{sen}\ x} \\ \csc x = \dfrac{1}{\text{sen}\ x} \end{cases}$$

$$\int \text{sen}\ ax \cdot \cos bx\ dx = \frac{1}{2}\int \left[\text{sen}\left(ax+bx\right) + \text{sen}\left(ax-bx\right)\right]$$

$$\int \text{sen}\ ax \cdot \text{sen}\ bx\ dx = \frac{1}{2}\int \left[\cos\left(ax-bx\right) - \cos\left(ax+bx\right)\right]$$

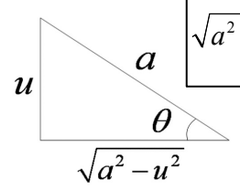
$$\int \cos ax \cdot \cos bx\ dx = \frac{1}{2}\int \left[\text{sen}\left(ax-bx\right) + \text{sen}\left(ax+bx\right)\right]$$

$$\left.\begin{array}{l} \int \tan^{impar} x \cdot \sec^{par} x\ dx \\ \int \tan^{par} x \cdot \sec^{par} x\ dx \end{array}\right\} \Rightarrow \begin{cases} u = \tan x \\ du = \sec^2 x\ dx \\ \sec^2 x = \tan^2 x + 1 \end{cases}$$

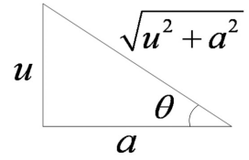
$$\int \tan^{impar} x \cdot \sec^{impar} x\ dx \Rightarrow \begin{cases} u = \sec x \\ du = \sec x \cdot \tan x\ dx \end{cases}$$

$$\int \tan^{par} x \cdot \sec^{impar} x\ dx \Rightarrow \begin{cases} \tan^2 x = \sec^2 x - 1 \\ \textit{Integrar por partes} \end{cases}$$

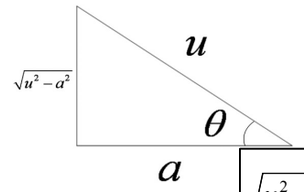
Sustituciones Trigonométricas



$$\sqrt{a^2-u^2} \Rightarrow \begin{cases} \sqrt{a^2-u^2} = a\cos\theta \\ u = a\,\text{sen}\,\theta \end{cases}$$



$$\sqrt{a^2+u^2} \Rightarrow \begin{cases} \sqrt{a^2+u^2} = a\sec\theta \\ u = a\tan\theta \end{cases}$$



$$\sqrt{u^2-a^2} \Rightarrow \begin{cases} \sqrt{u^2-a^2} = a\tan\theta \\ u = a\sec\theta \end{cases}$$