



## Integrales

1.  $\int (du + dv) = \int du + \int dv + c$
  2.  $\int a du = a \int du + c$
  3.  $\int dx = x + c$
  4.  $\int u^n du = \frac{u^{n+1}}{n+1} + c, n \neq -1$
  5.  $\int \frac{du}{u} = \ln |u| + c$
  6.  $\int a^u du = \frac{a^u}{\ln a} + c$
  7.  $\int e^u du = e^u + c$
  8.  $\int \operatorname{sen} u du = -\cos u + c$
  9.  $\int \cos u du = \operatorname{sen} u + c$
  10.  $\int \sec^2 u du = \tan u + c$
  11.  $\int \csc^2 u du = -\cot u + c$
  12.  $\int \sec u \tan u du = \sec u + c$
  13.  $\int \csc u \cot u du = -\csc u + c$
  14.  $\int \tan u du = -\ln |\cos u| + c$
  15.  $\int \cot u du = \ln |\operatorname{sen} u| + c$
  16.  $\int \sec u du = \ln |\sec u + \tan u| + c$
  17.  $\int \csc u du = \ln |\csc u - \cot u| + c$
  18.  $\int \frac{du}{u^2 + a^2} = \frac{1}{a} \arctan \frac{u}{a} + c$
  19.  $\int \frac{du}{u^2 - a^2} = \frac{1}{2a} \ln \left| \frac{u-a}{u+a} \right| + c, u^2 > a^2$
  20.  $\int \frac{du}{a^2 - u^2} = \frac{1}{2a} \ln \left| \frac{a+u}{a-u} \right| + c, u^2 < a^2$
  21.  $\int \frac{du}{\sqrt{a^2 - u^2}} = \operatorname{arcsen} \frac{u}{a} + c$
  22.  $\int \frac{du}{\sqrt{u^2 \pm a^2}} = \ln |u + \sqrt{u^2 \pm a^2}| + c$
  23.  $\int \sqrt{a^2 - u^2} du = \frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \operatorname{arcsen} \frac{u}{a} + c$
  24.  $\int \sqrt{u^2 \pm a^2} du = \frac{u}{2} \sqrt{u^2 \pm a^2} \pm \frac{a^2}{2} \ln |u + \sqrt{u^2 \pm a^2}| + c$
  25.  $\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \operatorname{arcsec} \frac{u}{a} + c$
- Integración por partes**
26.  $\int u dv = uv - \int v du$
- Fórmulas de reducción**
27.  $\int \operatorname{sen}^2 v dv = \frac{1}{2}v - \frac{1}{4}\operatorname{sen} 2v + c$
  28.  $\int \cos^2 v dv = \frac{1}{2}v + \frac{1}{4}\operatorname{sen} 2v + c$
  29.  $\int \tan^2 v dv = \tan v - v + c$
  30.  $\int \cot^2 v dv = -\cot v - v + c$
  31.  $\int \operatorname{sen}^3 v dv = -\frac{1}{3}(2 + \operatorname{sen}^2 v) \cos v + c$
  32.  $\int \cos^3 v dv = \frac{1}{3}(2 + \cos^2 v) \operatorname{sen} v + c$
  33.  $\int \tan^3 v dv = \frac{1}{2} \tan^2 v + \ln |\cos v| + c$
  34.  $\int \cot^3 v dv = -\frac{1}{2} \cot^2 v - \ln |\operatorname{sen} v| + c$
  35.  $\int \sec^3 v dv = \frac{1}{2} \sec v \tan v + \frac{1}{2} \ln |\sec v + \tan v| + c$
  36.  $\int \csc^3 v dv = -\frac{1}{2} \csc v \cot v + \frac{1}{2} \ln |\csc v - \cot v| + c$
  37.  $\int v \operatorname{sen} v dv = \operatorname{sen} v - v \cos v + c$
  38.  $\int v \cos v dv = \cos v + v \operatorname{sen} v + c$
  39.  $\int \operatorname{arcsen} v dv = v \operatorname{arcsen} v + \sqrt{1-v^2} + c$
  40.  $\int \arccos v dv = v \arccos v - \sqrt{1-v^2} + c$
  41.  $\int \arctan v dv = v \arctan v - \frac{1}{2} \ln |1+v^2| + c$
  42.  $\int v \operatorname{arcsen} v dv = \frac{2v^2-1}{4} \operatorname{arcsen} v + \frac{v\sqrt{1-v^2}}{4} + c$
  43.  $\int v \arccos v dv = \frac{2v^2-1}{4} \arccos v - \frac{v\sqrt{1-v^2}}{4} + c$
  44.  $\int u e^{au} du = \frac{1}{a^2}(au-1)e^{au} + c$
  45.  $\int e^{au} \operatorname{sen} bu du = \frac{e^{au}}{a^2 + b^2}(a \operatorname{sen} bu - b \cos bu) + c$
  46.  $\int e^{au} \cos bu du = \frac{e^{au}}{a^2 + b^2}(a \cos bu + b \operatorname{sen} bu) + c$
  47.  $\int \ln u du = u \ln u - u + c$
  48.  $\int \frac{du}{u \ln u} = \ln |\ln u| + c$
  49.  $\int \ln(u^2 + a^2) du = u \ln(u^2 + a^2) - 2u + 2a \operatorname{arctan} \frac{u}{a} + c$
  50.  $\int \ln |u^2 - a^2| du = u \ln |u^2 - a^2| - 2u + a \ln \left| \frac{u+a}{u-a} \right| + c$
  51.  $\int \operatorname{senh} u du = \cosh u + c$
  52.  $\int \cosh u du = \operatorname{senh} u + c$
  53.  $\int \tanh u du = \ln |\cosh u| + c$
  54.  $\int \coth u du = \ln |\operatorname{senh} u| + c$
  55.  $\int \operatorname{sech}^2 u du = \operatorname{tanh} u + c$
  56.  $\int \operatorname{csch}^2 u du = -\coth u + c$
  57.  $\int \operatorname{sech} u \operatorname{tanh} u du = -\operatorname{sech} u + c$
  58.  $\int \operatorname{csch} u \coth u du = -\operatorname{csch} u + c$
  59.  $\int u^2 \sqrt{u^2 \pm a^2} du = \frac{u}{8}(2u^2 \pm a^2) \sqrt{u^2 \pm a^2} - \frac{a^4}{8} \ln |u + \sqrt{u^2 \pm a^2}| + c$
  60.  $\int \frac{\sqrt{u^2 + a^2}}{u} du = \sqrt{u^2 + a^2} - a \ln \left| \frac{a + \sqrt{u^2 + a^2}}{u} \right| + c$
  61.  $\int \frac{\sqrt{u^2 \pm a^2}}{u^2} du = -\frac{\sqrt{u^2 \pm a^2}}{u} + \ln |u + \sqrt{u^2 \pm a^2}| + c$
  62.  $\int \frac{u^2}{\sqrt{u^2 \pm a^2}} du = \frac{u}{2} \sqrt{u^2 \pm a^2} \mp \frac{a^2}{2} \ln |u + \sqrt{u^2 \pm a^2}| + c$
  63.  $\int \frac{du}{u\sqrt{u^2 + a^2}} = -\frac{1}{a} \ln \left| \frac{a + \sqrt{u^2 + a^2}}{u} \right| + c$
  64.  $\int \frac{du}{u^2 \sqrt{u^2 \pm a^2}} = \frac{\sqrt{u^2 \pm a^2}}{a^2 u} + c$
  65.  $\int \frac{\sqrt{u^2 - a^2}}{u} du = \sqrt{u^2 - a^2} - a \arccos \frac{a}{u} + c$
  66.  $\int \frac{du}{(u^2 - a^2)^{3/2}} = \frac{u}{a^2 \sqrt{u^2 - a^2}} + c$
  67.  $\int u^2 \sqrt{a^2 - u^2} du = \frac{u}{8}(2u^2 - a^2) \sqrt{a^2 - u^2} + \frac{a^4}{8} \operatorname{arcsen} \frac{u}{a} + c$



## Derivadas

1.  $\frac{d}{dx}(c) = 0$
2.  $\frac{d}{dx}(x) = 1$
3.  $\frac{d}{dx}(cu) = c \frac{du}{dx}$
4.  $\frac{d}{dx}(u + v) = \frac{du}{dx} + \frac{dv}{dx}$
5.  $\frac{d}{dx}(x^n) = n x^{n-1}$
6.  $\frac{d}{dx}(u^n) = n u^{n-1} \frac{du}{dx}$
7.  $\frac{d}{dx}(u \cdot v) = u \frac{dv}{dx} + v \frac{du}{dx}$
8.  $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$
9.  $\frac{d}{dx}(\text{sen } u) = \cos u \frac{du}{dx}$
10.  $\frac{d}{dx}(\text{cos } u) = -\text{sen } u \frac{du}{dx}$
11.  $\frac{d}{dx}(\text{tan } u) = \text{sec}^2 u \frac{du}{dx}$
12.  $\frac{d}{dx}(\cot u) = -\text{csc}^2 u \frac{du}{dx}$
13.  $\frac{d}{dx}(\sec u) = \sec u \tan u \frac{du}{dx}$
14.  $\frac{d}{dx}(\csc u) = -\text{csc } u \cot u \frac{du}{dx}$
15.  $\frac{d}{dx}(\arcsen u) = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$
16.  $\frac{d}{dx}(\arccos u) = -\frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$
17.  $\frac{d}{dx}(\arctan u) = \frac{1}{1+u^2} \frac{du}{dx}$
18.  $\frac{d}{dx}(\text{arccot } u) = -\frac{1}{1+u^2} \frac{du}{dx}$
19.  $\frac{d}{dx}(\text{arcsec } u) = \frac{1}{u\sqrt{u^2-1}} \frac{du}{dx}$
20.  $\frac{d}{dx}(\text{arccsc } u) = -\frac{1}{u\sqrt{u^2-1}} \frac{du}{dx}$
21.  $\frac{d}{dx}(\log_a u) = \frac{1}{u} \log_a e \frac{du}{dx}$
22.  $\frac{d}{dx}(\ln u) = \frac{1}{u} \frac{du}{dx}$
23.  $\frac{d}{dx}(a^u) = a^u \ln a \frac{du}{dx}$
24.  $\frac{d}{dx}(e^u) = e^u \frac{du}{dx}$
25.  $\frac{d}{dx}(u^v) = v u^{v-1} \frac{du}{dx} + u^v \ln u \frac{dv}{dx}$

### Regla de la cadena

$$\frac{df}{du} \cdot \frac{du}{dx} = \frac{df}{dx}$$

$$df = \frac{\partial f}{\partial x} dx + \frac{\partial f}{\partial y} dy$$

**Propiedades de los logaritmos** Si  $A$  y  $B$  son números reales positivos

- $\log A + \log B = \log(AB)$
- $\log A - \log B = \log\left(\frac{A}{B}\right)$
- $r \cdot \log B = \log B^r$

## Identidades Trigonómicas

1.  $\csc A = \frac{1}{\text{sen } A}$
2.  $\sec A = \frac{1}{\text{cos } A}$
3.  $\cot A = \frac{1}{\text{tan } A}$
4.  $\tan A = \frac{\text{sen } A}{\text{cos } A}$
5.  $\cot A = \frac{\text{cos } A}{\text{sen } A}$
6.  $\text{sen}^2 A + \text{cos}^2 A = 1$
7.  $\tan^2 A + 1 = \sec^2 A$
8.  $1 + \cot^2 A = \csc^2 A$
9.  $\text{sen}^2 A = \frac{1}{2} - \frac{1}{2} \cos 2A$
10.  $\text{cos}^2 A = \frac{1}{2} + \frac{1}{2} \cos 2A$
11.  $\text{sen } 2A = 2 \text{sen } A \text{cos } A$
12.  $\text{cos } 2A = \text{cos}^2 A - \text{sen}^2 A$

### Ángulos Compuestos

13.  $2\text{sen } A \text{sen } B = \cos(A - B) - \cos(A + B)$
14.  $2\text{sen } A \text{cos } B = \text{sen}(A + B) + \text{sen}(A - B)$
15.  $2\text{cos } A \text{sen } B = \text{sen}(A + B) - \text{sen}(A - B)$
16.  $2\text{cos } A \text{cos } B = \cos(A + B) + \cos(A - B)$
17.  $\text{sen}(A + B) = \text{sen } A \text{cos } B + \text{cos } A \text{sen } B$
18.  $\text{sen}(A - B) = \text{sen } A \text{cos } B - \text{cos } A \text{sen } B$
19.  $\text{cos}(A + B) = \text{cos } A \text{cos } B - \text{sen } A \text{sen } B$
20.  $\text{cos}(A - B) = \text{cos } A \text{cos } B + \text{sen } A \text{sen } B$
21.  $\tan(2A) = \frac{2 \tan A}{1 - \tan^2 A}$
22.  $\tan \frac{A}{2} = \frac{1 - \cos A}{\text{sen } A}$

## Transformada de Laplace

1.  $\mathcal{L}\{1\} = \frac{1}{s}$
2.  $\mathcal{L}\{t\} = \frac{1}{s^2}$
3.  $\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}}, n \in \mathbb{Z}^+$
4.  $\mathcal{L}\{e^{at}\} = \frac{1}{s-a}$
5.  $\mathcal{L}\{\text{sen } kt\} = \frac{k}{s^2 + k^2}$
6.  $\mathcal{L}\{\text{cos } kt\} = \frac{s}{s^2 + k^2}$
7.  $\mathcal{L}\{\text{senh } kt\} = \frac{k}{s^2 - k^2}$
8.  $\mathcal{L}\{\text{cosh } kt\} = \frac{s}{s^2 - k^2}$
9.  $\mathcal{L}\{e^{at} f(t)\} = F(s-a)$
10.  $\mathcal{L}\{\mathcal{U}(t-a)\} = \frac{e^{-as}}{s}$
11.  $\mathcal{L}\{f(t-a)\mathcal{U}(t-a)\} = e^{-as} F(s)$
12.  $\mathcal{L}\{f^{(n)}(t)\} = s^n F(s) - s^{n-1} f(0) - \dots - f^{(n-1)}(0)$
13.  $\mathcal{L}\{t^n f(t)\} = (-1)^n \frac{d^n}{ds^n} F(s)$