LISTA DE DERIVADAS

Reglas

1. Constante: $\frac{d}{dx}c = 0$

2. Múltiplo constante: $\frac{d}{dx}cf(x) = cf'(x)$

3. Suma: $\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$

4. Producto: $\frac{d}{dx}f(x)g(x) = f(x)g'(x) + g(x)f'(x)$

5. Cociente: $\frac{d}{dx}\frac{f(x)}{g(x)} = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

6. Cadena: $\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$

7. Potencia: $\frac{d}{dx}x^n = nx^{n-1}$

8. Potencia: $\frac{d}{dx}[g(x)]^n = n[g(x)]^{n-1}g'(x)$

Funciones

Trigonométricas:

9. $\frac{d}{dx}\operatorname{sen} x = \cos x$

10. $\frac{d}{dx}\cos x = -\operatorname{sen} x$

11. $\frac{d}{dx}\tan x = \sec^2 x$

12. $\frac{d}{dx}\cot x = -\csc^2 x$

13. $\frac{d}{dx}\sec x = \sec x \tan x$

14. $\frac{d}{dx}\csc x = -\csc x \cot x$

Trigonométricas inversas:

15. $\frac{d}{dx}\operatorname{sen}^{-1} x = \frac{1}{\sqrt{1-x^2}}$

16. $\frac{d}{dx}\cos^{-1} x = -\frac{1}{\sqrt{1-x^2}}$

17. $\frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$

18. $\frac{d}{dx}\cot^{-1} x = -\frac{1}{1+x^2}$

19. $\frac{d}{dx}\sec^{-1} x = \frac{1}{|x|\sqrt{x^2-1}}$

20. $\frac{d}{dx}\csc^{-1} x = -\frac{1}{|x|\sqrt{x^2-1}}$

Hiperbólicas:

21. $\frac{d}{dx}\operatorname{senh} x = \cosh x$

22. $\frac{d}{dx}\cosh x = \operatorname{senh} x$

23. $\frac{d}{dx}\tanh x = \operatorname{sech}^2 x$

24. $\frac{d}{dx}\coth x = -\operatorname{csch}^2 x$

25. $\frac{d}{dx}\operatorname{sech} x = -\operatorname{sech} x \tanh x$

26. $\frac{d}{dx}\operatorname{csch} x = -\operatorname{csch} x \coth x$

Hiperbólicas inversas:

27. $\frac{d}{dx}\operatorname{senh}^{-1} x = \frac{1}{\sqrt{x^2+1}}$

28. $\frac{d}{dx}\cosh^{-1} x = \frac{1}{\sqrt{x^2-1}}$

29. $\frac{d}{dx}\tanh^{-1} x = \frac{1}{1-x^2}$

30. $\frac{d}{dx}\coth^{-1} x = \frac{1}{1-x^2}$

31. $\frac{d}{dx}\operatorname{sech}^{-1} x = -\frac{1}{x\sqrt{1-x^2}}$

32. $\frac{d}{dx}\operatorname{csch}^{-1} x = -\frac{1}{|x|\sqrt{x^2+1}}$

Exponencial:

33. $\frac{d}{dx}e^x = e^x$

34. $\frac{d}{dx}b^x = b^x(\ln b)$

Logarítmica:

35. $\frac{d}{dx}\ln|x| = \frac{1}{x}$

36. $\frac{d}{dx}\log_b x = \frac{1}{x(\ln b)}$

BREVE TABLA DE INTEGRALES

1. $\int u^n\,du = \frac{u^{n+1}}{n+1} + C,\ n \neq -1$

2. $\int \frac{1}{u}\,du = \ln|u| + C$

3. $\int e^u\,du = e^u + C$

4. $\int a^u\,du = \frac{1}{\ln a}a^u + C$

5. $\int \operatorname{sen} u\,du = -\cos u + C$

6. $\int \cos u\,du = \operatorname{sen} u + C$

7. $\int \sec^2 u\,du = \tan u + C$

8. $\int \csc^2 u\,du = -\cot u + C$

9. $\int \sec u \tan u\,du = \sec u + C$

10. $\int \csc u \cot u\,du = -\csc u + C$

11. $\int \tan u\,du = -\ln|\cos u| + C$

12. $\int \cot u\,du = \ln|\operatorname{sen} u| + C$

13. $\int \sec u\,du = \ln|\sec u + \tan u| + C$

14. $\int \csc u\,du = \ln|\csc u - \cot u| + C$

15. $\int u \operatorname{sen} u\,du = \operatorname{sen} u - u\cos u + C$

16. $\int u\cos u\,du = \cos u + u\operatorname{sen} u + C$

17. $\int \operatorname{sen}^2 u\,du = \frac{1}{2}u - \frac{1}{4}\operatorname{sen} 2u + C$

18. $\int \cos^2 u\,du = \frac{1}{2}u + \frac{1}{4}\operatorname{sen} 2u + C$

19. $\int \tan^2 u\,du = \tan u - u + C$

20. $\int \cot^2 u\,du = -\cot u - u + C$

21. $\int \operatorname{sen}^3 u\,du = -\frac{1}{3}\left(2 + \operatorname{sen}^2 u\right)\cos u + C$

22. $\int \cos^3 u\,du = \frac{1}{3}\left(2 + \cos^2 u\right)\operatorname{sen} u + C$

23. $\int \tan^3 u\,du = \frac{1}{2}\tan^2 u + \ln|\cos u| + C$

24. $\int \cot^3 u\,du = -\frac{1}{2}\cot^2 u - \ln|\operatorname{sen} u| + C$

25. $\int \sec^3 u\,du = \frac{1}{2}\sec u \tan u + \frac{1}{2}\ln|\sec u + \tan u| + C$

26. $\int \csc^3 u\,du = -\frac{1}{2}\csc u \cot u + \frac{1}{2}\ln|\csc u - \cot u| + C$

27. $\int \operatorname{sen} au \cos bu\,du = \frac{\operatorname{sen}(a-b)u}{2(a-b)} - \frac{\operatorname{sen}(a+b)u}{2(a+b)} + C$

28. $\int \cos au \cos bu\,du = \frac{\operatorname{sen}(a-b)u}{2(a-b)} + \frac{\operatorname{sen}(a+b)u}{2(a+b)} + C$

29. $\int e^{au} \operatorname{sen} bu\,du = \frac{e^{au}}{a^2+b^2}(a\operatorname{sen} bu - b\cos bu) + C$

30. $\int e^{au}\cos bu\,du = \frac{e^{au}}{a^2+b^2}(a\cos bu + b\operatorname{sen} bu) + C$

31. $\int \operatorname{senh} u\,du = \cosh u + C$

32. $\int \cosh u\,du = \operatorname{senh} u + C$

33. $\int \operatorname{sech}^2 u\,du = \tanh u + C$

34. $\int \operatorname{csch}^2 u\,du = -\coth u + C$

35. $\int \tanh u\,du = \ln(\cosh u) + C$

36. $\int \coth u\,du = \ln|\operatorname{senh} u| + C$

37. $\int \ln u\,du = u\ln u - u + C$

38. $\int u\ln u\,du = \frac{1}{2}u^2\ln u - \frac{1}{4}u^2 + C$

39. $\int \frac{1}{\sqrt{a^2-u^2}}\,du = \operatorname{sen}^{-1}\frac{u}{a} + C$

40. $\int \frac{1}{\sqrt{a^2+u^2}}\,du = \ln\left|u + \sqrt{a^2+u^2}\right| + C$

41. $\int \sqrt{a^2-u^2}\,du = \frac{u}{2}\sqrt{a^2-u^2} + \frac{a^2}{2}\operatorname{sen}^{-1}\frac{u}{a} + C$

42. $\int \sqrt{a^2+u^2}\,du = \frac{u}{2}\sqrt{a^2+u^2} + \frac{a^2}{2}\ln\left|u + \sqrt{a^2+u^2}\right| + C$

43. $\int \frac{1}{a^2+u^2}\,du = \frac{1}{a}\tan^{-1}\frac{u}{a} + C$

44. $\int \frac{1}{a^2-u^2}\,du = \frac{1}{2a}\ln\left|\frac{a+u}{a-u}\right| + C$

TABLA DE TRANSFORMADAS DE LAPLACE

	$f(t)$	$\mathcal{L}\{f(t)\} = F(s)$
1.	1	$\frac{1}{s}$
2.	t	$\frac{1}{s^2}$
3.	t^n	$\frac{n!}{s^{n+1}}$, n un entero positivo
4.	$t^{-1/2}$	$\sqrt{\frac{\pi}{s}}$
5.	$t^{1/2}$	$\frac{\sqrt{\pi}}{2s^{3/2}}$
6.	t^{α}	$\frac{\Gamma(\alpha+1)}{s^{\alpha+1}}$, $\alpha > -1$
7.	$\operatorname{sen} kt$	$\frac{k}{s^2+k^2}$
8.	$\cos kt$	$\frac{s}{s^2+k^2}$
9.	$\operatorname{sen}^2 kt$	$\frac{2k^2}{s(s^2+4k^2)}$
10.	$\cos^2 kt$	$\frac{s^2+2k^2}{s(s^2+4k^2)}$
11.	e^{at}	$\frac{1}{s-a}$
12.	$\operatorname{senh} kt$	$\frac{k}{s^2-k^2}$
13.	$\cosh kt$	$\frac{s}{s^2-k^2}$
14.	$\operatorname{senh}^2 kt$	$\frac{2k^2}{s(s^2-4k^2)}$
15.	$\cosh^2 kt$	$\frac{s^2-2k^2}{s(s^2-4k^2)}$
16.	te^{at}	$\frac{1}{(s-a)^2}$
17.	$t^n e^{at}$	$\frac{n!}{(s-a)^{n+1}}$, n un entero positivo
18.	$e^{at}\operatorname{sen} kt$	$\frac{k}{(s-a)^2+k^2}$
19.	$e^{at}\cos kt$	$\frac{s-a}{(s-a)^2+k^2}$
20.	$e^{at}\operatorname{senh} kt$	$\frac{k}{(s-a)^2-k^2}$
21.	$e^{at}\cosh kt$	$\frac{s-a}{(s-a)^2-k^2}$
22.	$t\operatorname{sen} kt$	$\frac{2ks}{(s^2+k^2)^2}$
23.	$t\cos kt$	$\frac{s^2-k^2}{(s^2+k^2)^2}$
24.	$\operatorname{sen} kt + kt\cos kt$	$\frac{2ks^2}{(s^2+k^2)^2}$
25.	$\operatorname{sen} kt - kt\cos kt$	$\frac{2k^3}{(s^2+k^2)^2}$
26.	$t\operatorname{senh} kt$	$\frac{2ks}{(s^2-k^2)^2}$
27.	$t\cosh kt$	$\frac{s^2+k^2}{(s^2-k^2)^2}$
28.	$\frac{e^{at}-e^{bt}}{a-b}$	$\frac{1}{(s-a)(s-b)}$
29.	$\frac{ae^{at}-be^{bt}}{a-b}$	$\frac{s}{(s-a)(s-b)}$
30.	$1-\cos kt$	$\frac{k^2}{s(s^2+k^2)}$
31.	$kt-\operatorname{sen} kt$	$\frac{k^3}{s^2(s^2+k^2)}$
32.	$\frac{a\operatorname{sen} bt - b\operatorname{sen} at}{ab(a^2-b^2)}$	$\frac{1}{(s^2+a^2)(s^2+b^2)}$
33.	$\frac{\cos bt - \cos at}{a^2-b^2}$	$\frac{s}{(s^2+a^2)(s^2+b^2)}$
34.	$\operatorname{sen} kt\operatorname{senh} kt$	$\frac{2k^2s}{s^4+4k^4}$
35.	$\operatorname{sen} kt\cosh kt$	$\frac{k(s^2+2k^2)}{s^4+4k^4}$
36.	$\cos kt\operatorname{sinh} kt$	$\frac{k(s^2-2k^2)}{s^4+4k^4}$
37.	$\cos kt\cosh kt$	$\frac{s^3}{s^4+4k^4}$
38.	$J_0(kt)$	$\frac{1}{\sqrt{s^2+k^2}}$

	$f(t)$	$\mathcal{L}\{f(t)\} = F(s)$
39.	$\dfrac{e^{bt} - e^{at}}{t}$	$\ln\dfrac{s-a}{s-b}$
40.	$\dfrac{2(1-\cos kt)}{t}$	$\ln\dfrac{s^2+k^2}{s^2}$
41.	$\dfrac{2(1-\cosh kt)}{t}$	$\ln\dfrac{s^2-k^2}{s^2}$
42.	$\dfrac{\operatorname{sen} at}{t}$	$\arctan\left(\dfrac{a}{s}\right)$
43.	$\dfrac{\operatorname{sen} at\cos bt}{t}$	$\dfrac{1}{2}\arctan\dfrac{a+b}{s} + \dfrac{1}{2}\arctan\dfrac{a-b}{s}$
44.	$\dfrac{1}{\sqrt{\pi t}}e^{-a^2/4t}$	$\dfrac{e^{-a\sqrt{s}}}{\sqrt{s}}$
45.	$\dfrac{a}{2\sqrt{\pi t^3}}e^{-a^2/4t}$	$e^{-a\sqrt{s}}$
46.	$\operatorname{erfc}\left(\dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{e^{-a\sqrt{s}}}{s}$
47.	$2\sqrt{\dfrac{t}{\pi}}e^{-a^2/4t} - a\operatorname{erfc}\left(\dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{e^{-a\sqrt{s}}}{s\sqrt{s}}$
48.	$e^{ab}e^{b^2t}\operatorname{erfc}\left(b\sqrt{t} + \dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{e^{-a\sqrt{s}}}{\sqrt{s}(\sqrt{s}+b)}$
49.	$-e^{ab}e^{b^2t}\operatorname{erfc}\left(b\sqrt{t} + \dfrac{a}{2\sqrt{t}}\right) + \operatorname{erfc}\left(\dfrac{a}{2\sqrt{t}}\right)$	$\dfrac{be^{-a\sqrt{s}}}{s(\sqrt{s}+b)}$
50.	$e^{at}f(t)$	$F(s-a)$
51.	$\mathcal{U}(t-a)$	$\dfrac{e^{-as}}{s}$
52.	$f(t-a)\mathcal{U}(t-a)$	$e^{-as}F(s)$
53.	$g(t)\mathcal{U}(t-a)$	$e^{-as}\mathcal{L}\{g(t+a)\}$
54.	$f^{(n)}(t)$	$s^nF(s) - s^{(n-1)}f(0) - \cdots - f^{(n-1)}(0)$
55.	$t^nf(t)$	$(-1)^n\dfrac{d^n}{ds^n}F(s)$
56.	$\displaystyle\int_0^t f(\tau)g(t-\tau)\,d\tau$	$F(s)G(s)$
57.	$\delta(t)$	1
58.	$\delta(t-t_0)$	e^{-st_0}