

DERIVADAS

En las siguientes fórmulas u , v , w representan funciones de x , mientras que a , c , n representan constantes. Todos los argumentos de las funciones trigonométricas están medidos en radianes, y todas las funciones trigonométricas inversas y funciones hiperbólicas representan valores principales.

$$1. \frac{d}{dx}(a) = 0$$

$$2. \frac{d}{dx}(x) = 1$$

$$3. \frac{d}{dx}(au) = a \frac{du}{dx}$$

$$4. \frac{d}{dx}(u + v - w) = \frac{du}{dx} + \frac{dv}{dx} - \frac{dw}{dx}$$

$$5. \frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$6. \frac{d}{dx}(uvw) = uv \frac{dw}{dx} + vw \frac{du}{dx} + uw \frac{dv}{dx}$$

$$7. \frac{d}{dx}\left(\frac{u}{v}\right) = \frac{1}{v} \frac{du}{dx} - \frac{u}{v^2} \frac{dv}{dx}$$

$$8. \frac{d}{dx}(u^n) = n u^{n-1} \frac{du}{dx}$$

$$9. \frac{d}{dx}(\sqrt{u}) = \frac{1}{2\sqrt{u}} \frac{du}{dx}$$

$$10. \frac{d}{dx}\left(\frac{1}{u}\right) = \frac{-1}{u^2} \frac{du}{dx}$$

$$11. \frac{d}{dx}\left(\frac{1}{u^n}\right) = \frac{-n}{u^{n+1}} \frac{du}{dx}$$

$$12. \frac{d}{dx}\left(\frac{u^n}{v^m}\right) = \frac{u^{n-1}}{v^{m+1}} \left(n v \frac{du}{dx} - m u \frac{dv}{dx} \right)$$

$$13. \frac{d}{dx}(u^n v^m) = u^{n-1} v^{m-1} \left(n v \frac{du}{dx} + m u \frac{dv}{dx} \right)$$

$$14. \frac{d}{dx}[f(u)] = \frac{d}{du}[f(u)] \cdot \frac{du}{dx}$$

$$15. \frac{d^2}{dx^2}[f(u)] = \frac{df(u)}{du} \cdot \frac{d^2u}{dx^2} + \frac{d^2f(u)}{du^2} \cdot \left(\frac{du}{dx}\right)^2$$

$$16. \frac{d^n}{dx^n}[uv] = \binom{n}{0} v \frac{d^n u}{dx^n} + \binom{n}{1} \frac{dv}{dx} \frac{d^{n-1}u}{dx^{n-1}} + \binom{n}{2} \frac{d^2v}{dx^2} \frac{d^{n-2}u}{dx^{n-2}} + \dots + \binom{n}{k} \frac{d^k v}{dx^k} \frac{d^{n-k}u}{dx^{n-k}} + \dots + \binom{n}{n} u \frac{d^n v}{dx^n}$$

$$17. \frac{du}{dx} = \frac{1}{\frac{dx}{du}} \quad \text{si } \frac{dx}{du} \neq 0$$

$$18. \frac{d}{dx}(\log_a u) = (\log_a e) \frac{1}{u} \frac{du}{dx}$$

$$19. \frac{d}{dx}(\log_e u) = (\log_e e) \frac{1}{u} \frac{du}{dx} = \frac{1}{u} \frac{du}{dx}$$

$$20. \frac{d}{dx}(a^u) = a^u (\log_e a) \frac{du}{dx}$$

$$21. \frac{d}{dx}(e^u) = e^u (\log_e e) \frac{du}{dx} = e^u \frac{du}{dx}$$

$$22. \frac{d}{dx}(u^v) = v u^{v-1} \frac{du}{dx} + (\log_e u) u^v \frac{dv}{dx}$$

$$23. \frac{d}{dx}(\sin u) = \frac{du}{dx} (\cos u)$$

$$24. \frac{d}{dx}(\cos u) = -\frac{du}{dx} (\sin u)$$

$$25. \frac{d}{dx}(\tan u) = \frac{du}{dx} (\sec^2 u)$$

$$26. \frac{d}{dx}(\cot u) = -\frac{du}{dx} (\csc^2 u)$$

$$27. \frac{d}{dx}(\sec u) = \frac{du}{dx} \sec u \cdot \tan u$$

$$28. \frac{d}{dx}(\csc u) = -\frac{du}{dx} \csc u \cdot \cot u$$

$$29. \frac{d}{dx}(\text{vers } u) = \frac{du}{dx} \sin u$$

$$30. \frac{d}{dx}(\text{arc sin } u) = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}, \quad \left(-\frac{\pi}{2} \leq \text{arc sin } u \leq \frac{\pi}{2}\right)$$

31. $\frac{d}{dx}(\arccos u) = -\frac{1}{\sqrt{1-u^2}} \frac{du}{dx}, \quad (0 \leq \arccos u \leq \pi)$
32. $\frac{d}{dx}(\arctan u) = \frac{1}{1+u^2} \frac{du}{dx}, \quad \left(-\frac{\pi}{2} < \arctan u < \frac{\pi}{2}\right)$
33. $\frac{d}{dx}(\operatorname{arccot} u) = -\frac{1}{1+u^2} \frac{du}{dx}, \quad (0 \leq \operatorname{arccot} u \leq \pi)$
34. $\frac{d}{dx}(\operatorname{arcsec} u) = \frac{1}{u\sqrt{u^2-1}} \frac{du}{dx}, \quad \left(0 \leq \operatorname{arcsec} u < \frac{\pi}{2}, -\pi \leq \operatorname{arcsec} u < \frac{\pi}{2}\right)$
35. $\frac{d}{dx}(\operatorname{arccsc} u) = -\frac{1}{u\sqrt{u^2-1}} \frac{du}{dx}, \quad \left(0 < \operatorname{arccsc} u \leq \frac{\pi}{2}, -\pi < \operatorname{arccsc} u \leq -\frac{\pi}{2}\right)$
36. $\frac{d}{dx}(\operatorname{arccvers} u) = \frac{1}{\sqrt{2u-u^2}} \frac{du}{dx}, \quad (0 \leq \operatorname{arccvers} u \leq \pi)$
37. $\frac{d}{dx}(\sinh u) = \frac{du}{dx} (\cosh u)$
38. $\frac{d}{dx}(\cosh u) = \frac{du}{dx} (\sinh u)$
39. $\frac{d}{dx}(\tanh u) = \frac{du}{dx} (\operatorname{sech}^2 u)$
40. $\frac{d}{dx}(\operatorname{coth} u) = -\frac{du}{dx} (\operatorname{csch}^2 u)$
41. $\frac{d}{dx}(\operatorname{sech} u) = -\frac{du}{dx} (\operatorname{sech} u \cdot \tanh u)$
42. $\frac{d}{dx}(\operatorname{csch} u) = -\frac{du}{dx} (\operatorname{csch} u \cdot \operatorname{coth} u)$
43. $\frac{d}{dx}(\sinh^{-1} u) = \frac{d}{dx} \left[\log(u + \sqrt{u^2+1}) \right] = \frac{1}{\sqrt{u^2+1}} \frac{du}{dx}$
44. $\frac{d}{dx}(\cosh^{-1} u) = \frac{d}{dx} \left[\log(u + \sqrt{u^2-1}) \right] = \frac{1}{\sqrt{u^2-1}} \frac{du}{dx}, \quad (u > 1, \cosh^{-1} u > 0)$
45. $\frac{d}{dx}(\tanh^{-1} u) = \frac{d}{dx} \left[\frac{1}{2} \log \frac{1+u}{1-u} \right] = \frac{1}{1-u^2} \frac{du}{dx}, \quad (u^2 < 1)$
46. $\frac{d}{dx}(\operatorname{coth}^{-1} u) = \frac{d}{dx} \left[\frac{1}{2} \log \frac{u+1}{u-1} \right] = \frac{1}{1-u^2} \frac{du}{dx}, \quad (u^2 > 1)$

$$47. \frac{d}{dx}(\operatorname{sech}^{-1} u) = \frac{d}{dx} \left[\log \frac{1 + \sqrt{1 - u^2}}{u} \right] = -\frac{1}{u\sqrt{1 - u^2}} \frac{du}{dx}, \quad (0 < u < 1, \operatorname{sech}^{-1} u > 0)$$

$$48. \frac{d}{dx}(\operatorname{csch}^{-1} u) = \frac{d}{dx} \left[\log \frac{1 + \sqrt{1 + u^2}}{u} \right] = -\frac{1}{|u|\sqrt{1 + u^2}} \frac{du}{dx}$$

$$49. \frac{d}{dq} \int_p^q f(x) dx = f(q), \quad (p \text{ constante})$$

$$50. \frac{d}{dp} \int_p^q f(x) dx = -f(p), \quad (q \text{ constante})$$

$$51. \frac{d}{da} \int_p^q f(x, a) dx = \int_p^q \frac{\partial}{\partial a} [f(x, a)] dx + f(q, a) \frac{dq}{da} - f(p, a) \frac{dp}{da}$$