

Taula de derivades

$$\begin{array}{ll}
 y = u + v & y' = u' + v' \\
 y = u - v & y' = u' - v' \\
 y = k \cdot u & y' = k \cdot u' \\
 y = u \cdot v & y' = u' \times v + u \cdot v' \\
 y = \frac{u}{v} & y' = \frac{u' \cdot v - u \cdot v'}{v^2} \\
 y = f(u) & y' = f'(u) \cdot u' \text{ (Regla de la cadena)} \\
 y = x^n & y' = n \cdot x^{n-1} \\
 y = e^x & y' = e^x \\
 y = a^x & y' = a^x \cdot \ln a \\
 y = \ln x & y' = \frac{1}{x} \\
 y = \sin x & y' = \cos x \\
 y = \cos x & y' = -\sin x \\
 y = \tan x & y' = \frac{1}{\cos^2 x} = 1 + \tan^2 x \\
 y = \operatorname{arctg} x & y' = \frac{1}{1+x^2}
 \end{array}$$

Exercicis de derivades

Troba les derivades de les següents funcions.

$$\begin{array}{ll}
 1. & y = x^3 - 3x^2 & y' = 3x^2 - 6x \\
 2. & y = x^{\frac{1}{2}} - x^{-\frac{1}{2}} & y' = \frac{x+1}{2x^{\frac{3}{2}}} \\
 3. & y = \frac{2}{3x^2} & y' = -\frac{4}{3x^3} \\
 4. & y = \sqrt{x^3 + 1} & y' = \frac{3x^2}{2\sqrt{x^3+1}} \\
 5. & y = (3x^2 + 7)(x^2 - 2x + 3) & y' = 12x^3 - 18x^2 + 32x - 14 \\
 6. & y = (x^2 - 1)^{\frac{3}{2}}(x^3 + 5) & y' = (s^2 - 1)^{\frac{3}{2}}(8x^4 - 3x^2 + 25x) \\
 7. & y = \frac{-2x^2}{x-1} & y' = \frac{4x-2x^2}{(x-1)^2} \\
 8. & y = \frac{x^2+x-1}{x^2-1} & y' = -\frac{x^2+1}{(x^2-1)^2} \\
 9. & y = -2(1 - 4x^2)^2 & y' = 32x - 128x^3 \\
 10. & y = \frac{1}{4-3x^2} & y' = \frac{6x}{(4-3x^2)^2} \\
 11. & y = \frac{2}{\sqrt{x+1}} & y' = -\frac{1}{(x+1)^{\frac{3}{2}}} \\
 12. & y = x^2 - \frac{1}{2} \cos x & y' = 2x + \frac{1}{2} \sin x \\
 13. & y = \frac{1}{x} - 3 \sin x & y' = -\frac{1}{x^2} - 3 \cos x \\
 14. & y = 4\sqrt{x} + 3 \cos x & y' = \frac{2}{\sqrt{x}} - 3 \sin x \\
 15. & y = x^2 \sin x & y' = x^2 \cos x + 2x \sin x \\
 16. & y = \frac{\cos x}{x} & y' = -\frac{x \sin x + \cos x}{x^2} \\
 17. & y = \tan x - x & y' = \frac{1}{\cos^2 x} - 1 = \tan^2 x
 \end{array}$$

$$\begin{array}{ll}
18. & y = \cos 3x \qquad y' = -3 \sin 3x \\
19. & y = 3 \tan 4x \qquad y' = 12 \frac{1}{\cos^2 4x} \\
20. & y = \sin \pi x \qquad y' = \pi \cos \pi x \\
21. & y = \sin^2 x \qquad y' = 2 \sin x \cos x \\
22. & y = \ln x^2 \qquad y' = \frac{2}{x} \\
23. & y = \ln \sqrt{x^4 - 4x} \qquad y' = \frac{2x^3 - 2}{x^4 - 4x} \\
24. & y = (\ln x)^4 \qquad y' = \frac{4(\ln x)^3}{x} \\
25. & y = \frac{\ln x}{x^2} \qquad y' = \frac{1 - 2 \ln x}{x^3} \\
26. & y = \frac{1}{4 - 3x^2} \qquad y' = \frac{6x}{(4 - 3x^2)^2}
\end{array}$$

Troba les derivades segones de les següents funcions.

$$\begin{array}{ll}
1. & y = \sqrt{x^2 + 9} \qquad y'' = \frac{9}{(x^2 + 9)^{\frac{3}{2}}} \\
2. & y = \frac{x}{(1-x)^2} \qquad y'' = \frac{2x-4}{((1-x)^4)} \\
3. & y = \frac{6x-5}{x^2+1} \qquad y'' = \frac{12x^3 - 30x^2 - 36x + 10}{(x^2+1)^2}
\end{array}$$