

***Factsheet:* Standard Derivatives**

Power rule

$$y = ax^n \qquad \frac{dy}{dx} = anx^{n-1}$$

Trigonometric functions

$$y = \sin kx \qquad \frac{dy}{dx} = k \cos kx$$

$$y = \cos kx \qquad \frac{dy}{dx} = -k \sin kx$$

$$y = \tan kx \qquad \frac{dy}{dx} = k \sec^2 kx$$

$$y = \csc x \qquad \frac{dy}{dx} = -\csc x \cot x$$

$$y = \sec x \qquad \frac{dy}{dx} = \sec x \tan x$$

$$y = \cot x \qquad \frac{dy}{dx} = -\csc^2 x$$

$$y = \sin^{-1} x \qquad \frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$y = \cos^{-1} x \qquad \frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}$$

$$y = \tan^{-1} x \qquad \frac{dy}{dx} = \frac{1}{1+x^2}$$

Exponentials and logarithms

$$y = e^{kx} \qquad \frac{dy}{dx} = ke^{kx}$$

$$y = \ln kx \qquad \frac{dy}{dx} = \frac{1}{x}$$

$$y = k^x \qquad \frac{dy}{dx} = k^x \ln k$$

$$y = \log_k x \qquad \frac{dy}{dx} = \frac{1}{x \ln k}$$

Rules for Differentiating

Multiplication by a constant k : If $y = k \cdot f(x)$ then $\frac{dy}{dx} = k \cdot \frac{df(x)}{dx}$

Addition/Subtraction Rule: If $y = u \pm v$ with $u = u(x)$ and $v = v(x)$, $\frac{dy}{dx} = \frac{du}{dx} \pm \frac{dv}{dx}$

Chain Rule: If $y = y(u)$ and $u = u(x)$, $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$

Product Rule: If $y = uv$ with $u = u(x)$ and $v = v(x)$, $\frac{dy}{dx} = u \cdot \frac{dv}{dx} + v \cdot \frac{du}{dx}$

Quotient Rule: If $y = \frac{u}{v}$ with $u = u(x)$ and $v = v(x)$, $\frac{dy}{dx} = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$

Want to know more?

If you have any further questions about this topic you can make an appointment to see a [Learning Enhancement Tutor](#) in the [Student Support Service](#), as well as speaking to your lecturer or adviser.

📞 Call: 01603 592761

💻 Ask: ask.let@uea.ac.uk

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