SUMMARY OF DERIVATIVE RULES

First consider **simple rules**.

Is a function the sum or difference of some terms? Deal with the terms one by one:

$$(3x - e^{2x} + \sqrt{2})' = (3x)' - (e^{2x})' + (\sqrt{2})'$$

Does it have a constant factor? Move it outside of derivative:

$$(4x^2)' = 4(x^2)', \quad \text{also} \quad \left(\frac{\ln x}{5}\right)' = \left(\frac{1}{5}\ln x\right)' = \frac{1}{5}(\ln x)'$$

If the thing of which you take derivative has no variable inside, the derivative is zero.

$$(\ln 2)' = 0, \quad \text{not } ''\frac{1}{2}''$$

Advanced rules: fit one of the following pattern to your function (if it helps, actually draw the boxes around the building blocks). The building blocks are marked u and v for ease of references.

Pattern in function	Rule to use	Pattern for derivative
$\boxed{u} \cdot \boxed{v}$	Product	$\boxed{u}' \cdot \boxed{v} + \boxed{u} \cdot \boxed{v}'$
$\dfrac{\boxed{u}}{\boxed{v}}$	Quotient	$\dfrac{\boxed{u}' \cdot \boxed{v} - \boxed{u} \cdot \boxed{v}'}{\boxed{v}^2}$
$\boxed{u}^a$	Power chain	$a\boxed{u}^{a-1} \cdot \boxed{u}'$
$\ln \boxed{u}$	Logarithmic chain	$\dfrac{1}{\boxed{u}} \cdot \boxed{u}'$
$e^{\boxed{u}}$	Exponential chain	$e^{\boxed{u}} \cdot \boxed{u}'$

After writing down the pattern for derivative, deal with each box marked with $'$; this is a separate computation of the derivative of the contents of that box.