F Primitive de $f \Leftrightarrow F'(x) = f(x)$ pour tout $x \in D_f$.

F est *primitive* de f si et seulement si f est *dérivée* de F .

On note : $F(x) = \int f(x)\,dx$.

Formules de Calcul de Primitives :

$\int 0.dx = k$ constante quelconque de $\mathbb{R}$	$\int \sin x\,dx = -\cos x + k$
$\int 1.dx = x + k$, $\int x\,dx = \frac{x^2}{2} + k$, $\int x^2\,dx = \frac{x^3}{3} + k$	$\int \cos x\,dx = \sin x + k$
$\int \frac{1}{x^2}\,dx = -\frac{1}{x} + k \Leftrightarrow \int x^{-1}\,dx = \frac{(x^{-1})}{-1} = -\frac{1}{x} + k$	$\int \frac{1}{x}\,dx = \int \frac{dx}{x} = \ln\lvert x\rvert + k$
$\int \frac{1}{\sqrt{x}}\,dx = 2\sqrt{x} + k \Leftrightarrow \int (x^{-1/2})\,dx = \frac{x^{1/2}}{\frac{1}{2}} = \frac{1}{2\sqrt{x}} + k$	$\int e^x\,dx = e^x + k$
Généralisation : $\boldsymbol{\int x^p\,dx = \frac{x^{p+1}}{p+1} + k}$ **,** $\boldsymbol{\forall\, p \in Q}$	

$\int (\lambda u)\,dx = \lambda \int u\,dx$ pour tout $\lambda \in \mathbb{R}$	$\int (5x^3)\,dx = 5\int x^3\,dx = 5(\frac{x^4}{4}) + k = \frac{5}{4}x^4 + k$
$\int (u + v)\,dx = \int u\,dx + \int v\,dx$	$\int (x + \sin x)\,dx = \int x\,dx + \int \sin x\,dx = \frac{x^2}{2} - \cos x + k$

Compositions de Fonctions : $\int f[u].u'dx = F(u) + k$ avec F primitive de f .

$\int u^n\, u'\,dx = \frac{u^{n+1}}{n+1} + k$, $\forall\, n \in N$	$\int \sin^2 x \cos x\,dx = \frac{1}{3}\sin^3 x + k$
$\int \frac{u'}{u^2}\,dx = -\frac{1}{u} + k \Leftrightarrow \int u^{-2}\,u'\,dx = \frac{u^{-1}}{-1} + k$ soit $-u^{-1} + k = -\frac{1}{u} + k$	$\int \frac{2x+1}{x^2+x+3}\,dx = -\frac{1}{x^2+x+3} + k$
$\int \frac{u'}{\sqrt{u}}\,dx = 2\sqrt{u} + k \Leftrightarrow \int u^{-1/2}\,u'\,dx = \frac{u^{1/2}}{\frac{1}{2}} + k$ soit $2u^{1/2} + k = 2\sqrt{u} + k$	$\int \frac{e^x}{\sqrt{e^x+1}}\,dx = 2\int \frac{u'}{2\sqrt{u}}\,dx = 2\sqrt{e^x+1} + k$
Généralisation : $\boldsymbol{\int u^p\, u'dx = \frac{u^{p+1}}{p+1} + k}$ **,** $\boldsymbol{\forall\, p \in Q}$	

$\int u' \sin u\,dx = -\cos u + k$ $\int u' \cos u\,dx = \sin u + k$	$\int \sin 3x\,dx = -\frac{1}{3}\cos 3x + k$

	$\int \cos\frac{x}{2}\,dx = 2\sin\frac{x}{2} + k$
$\int \frac{u'}{u}\,dx = \ln\lvert u\rvert + k$ $\int u'\,e^{u}\,dx = e^{u} + k$	$\int \frac{2x+5}{x^2+5x+3}\,dx = \ln\lvert x^2+5x+3\rvert + k$ $\int \frac{e^{1/x}}{x^2}\,dx = -\int(-\frac{1}{x^2})e^{1/x}\,dx = -\int u'e^{u}\,dx = -e^{1/x} + k$

Intégration par Parties : Primitives de formes *UV* , considérées comme étant *u'v* ou *uv'*

L'une des deux formes est simplificatrice, l'autre tout le contraire. Il faut déterminer le *bon choix* !

$\int u'v\,dx = uv - \int u\,v'dx$	$\begin{cases} u = x \Rightarrow u' = 1 \\ v' = \sin x \Rightarrow v = -\cos x \end{cases}$ $\int x\sin x\,dx = -x.\cos x + \int \cos x\,dx = -x.\cos x + \sin x + k$
$\int u\,v'\,dx = uv - \int u'\,v\,dx$	$\begin{cases} u' = x \Rightarrow u = \frac{x^2}{2} \\ v = \ln x \Rightarrow v' = \frac{1}{x} \end{cases}$ $\int x\ln x\,dx = \frac{x^2}{2}\ln x - \frac{1}{2}\int x\,dx = \frac{x^2}{2}\ln x - \frac{x^2}{2} + k$