Integral

$Defining\ u(t)\ and\ v(t)\ as\ functions\ of\ t\ the\ following\ rules\ apply$:

- $\int u + v\, dt = \int u\, dt + \int v\, dt$
- $\int au\, dt = a \int u\, dt$
- $\int a\, dt = at$
- $\int \frac{d}{dt} u\, .u^n\, dt = \frac{u^{n+1}}{n+1}$
- $\int \frac{d}{dt} u\ .e^u dt = e^u$
- $\int \frac{d}{dt} u\, .a^u\, dt = \frac{a^u}{\ln(a)}$
- $\int \frac{\frac{d}{dt} u}{u} dt = \ln|u|$
- $\int \frac{\frac{d}{dt} u}{1+u^2} dt = tan^{-1}(u)$
- $\int \frac{\frac{d}{dt} u}{\sqrt{1+u^2}} dt = sin^{-1}(u)$

$Trigonometric$

- $\int \frac{d}{dt} u.\ sin(u)\, dt = -cos(u)$
- $\int \frac{d}{dt} u.\ cos(u)\, dt = sin(u)$
- $\int \frac{d}{dt} u. \tan(u)\, dt = -\ln|\cos(u)|$
- $\int \frac{d}{dt} u. cot(u)\, dt = -\ln|sin(u)|$
- $\int \frac{d}{dt} u. sec(u)^2\, dt = tan(u)$
- $\int \frac{d}{dt} u. csc(u)^2\, dt = -cot(u)$
- $\int \frac{d}{dt} u. sec(u)\, dt = \ln|sec(u) + tg(u)|$
- $\int \frac{d}{dt} u. csc(u)\, dt = \ln|csc(u) + cot(u)|$

$Leibniz\ Integral\ Rule$: $$\int u.\frac{d}{dt} v\, dt = u.v - \int v.\frac{d}{dt} u$$

$Substitution\ Integral\ Rule$: $$\int u(t)\, dt = \int u\big(v(t)\big).\frac{d}{dt} v(t)\, dt$$

$Trigonometric\ substitutions$:

$\sqrt{a^2 - t^2}$	$t = a.sin(x)$
$\sqrt{a^2 + t^2}$	$t = a.tan(x)$
$\sqrt{t^2 - a^2}$	$t = a.sec(x)$