MATHEMATICAL TABLES

Table Of Derivatives

$y=f(x)$	$\bar{y}$
constant	**0**
x	**1**
x^n	$n\,x^{(n-1)}$
$u \pm v$	$\bar{u} \pm \bar{v}$
cu	cu
uv	$u\,\bar{v}+\bar{u}\,v$
$\frac{u}{v}$	$\bar{u}\,v-u\,\frac{\bar{v}}{(v^2)}, v\neq 0$
$\frac{c}{v}$	$\frac{-c}{v^2}*\bar{v}, v\neq 0$
u^v	$v\,u^{(v-1)}\,\bar{u}+u^v \ln u.v$
$y=f(u), u=\phi(x)$	$\frac{dy}{dx}=\frac{dy}{du}.\frac{du}{dx}$
$\sin(x)$	$\cos(x)$
$\cos(x)$	$-\sin(x)$
$\tan(x)$	$sec^2(x)$
$\cot(x)$	$-cosec^2(x)$
$sec(x)$	$sec(x)\tan(x)$
$cosec(x)$	$-cosec(x).\cot(x)$
e^x	e^x
$\ln(x)$	$\frac{1}{x}$
a^x	$a^x \ln(a)$
$\log_a x$	$\frac{1}{x}\log_a e$

$y=f(x), x=\phi(y)$	$\frac{dy}{dx}=1/(\frac{dx}{dy})$
$\sin^{-1}(x)$	$\frac{1}{\sqrt{(1-x^2)}}$
$\cos^{-1}(x)$	$\frac{-1}{\sqrt{(1-x^2)}}$
$\tan^{-1}(x)$	$\frac{1}{(1+x^2)}$
$\cot^{-1}(x)$	$\frac{-1}{(1+x^2)}$
$sec^{-1}(x)$	$\frac{1}{(x\sqrt{(x^2-1)})}$
$cosec^{-1}(x)$	$\frac{-1}{(x\sqrt{(x^2-1)})}$
$\sinh(x)$	$\cosh(x)$
$\cosh(x)$	$\sinh(x)$
$\tanh(x)$	$sech^2(x)$
$\coth(x)$	$-cosech^2(x)$
$sech(x)$	$-sech(x)\tanh(x)$
$cosech(x)$	$-cosech(x)\coth(x)$

$\sinh^{-1}(x)$	$\frac{1}{\sqrt{(x^2+1)}}$
$\cosh^{-1}(x)$	$\frac{1}{\sqrt{(x^2-1)}},(x>1)$
$\tanh^{-1}(x)$	$\frac{1}{(1-x^2)},(\lvert x\rvert<1)$
$\coth^{-1}(x)$	$\frac{-1}{(x^2-1)},(\lvert x\rvert>1)$
$sech^{-1}(x)$	$\frac{-1}{(x\sqrt{(1-x^2)})},(\lvert x\rvert<1)$
$cosech^{-1}(x)$	$\frac{-1}{(x\sqrt{(1+x^2)})}$
$x=\phi(t), y=\Psi(t)$	$\frac{dy}{dx}=\frac{dy}{dt}.\frac{dt}{dx}$

Table Of Integration

_تعريف التكامل كعملية عكسية للتفاضل نستطيع كتابة الجدول التالى

للتكاملات القياسية التى تستخدم أساسا عند حساب أى تكامل :

لاحظ أنه فى كل القوانين الاتية قد تكون ***u*** هى المتغير المستقل وقد تكون أية

دالة فى متغير ما

MATHEMTAICAL TABLES

$\int u^n\,du=\frac{u^{(n+1)}}{(n+1)}+c\,,(n\neq-1)$
$\int \frac{du}{u}=\ln u+c$
$\int \sin(u)\,du=-\cos(u)+c$
$\int \cos(u)\,du=\sin(u)+c$
$\int sec^2(u)\,du=\tan(u)+c$
$\int cosec^2(u)\,du=-\cot(u)+c$
$\int sec(u)\tan(u)\,du=sec(u)+c$
$\int cosec(u)\cot(u)\,du=-cosec(u)+c$
$\int \mathrm{e}^u\,du=\mathrm{e}^u+c$
$\int a^u\,du=\frac{a^u}{(\ln a)}+c$
$\int \frac{du}{(\sqrt{(a^2-u^2)})}=\sin^{-1}(\frac{u}{a})+c$
$\int \frac{du}{(a^2+u^2)}=\frac{1}{a}\tan^{-1}(\frac{u}{a})+c$
$\int \frac{du}{(u\sqrt{(u^2-a^2)})}=\frac{1}{a}sec^{-1}(\frac{u}{a})+c$
$\int \sinh(u)\,du=\cosh(u)+c$
$\int \cosh(u)\,du=\sinh(u)+c$
$\int sech^2(u)\,du=\tanh(u)+c$
$\int sech(u)\tanh(u)\,du=-sech(u)+c$
$\int cosech(u).\coth(u)\,du=-cosech(u)+c$
$\int cosech^2(u)\,du=-\coth(u)+c$
$\int \frac{du}{(\sqrt{(a^2+u^2)})}=\sinh^{-1}(\frac{u}{a})+c=\ln(u+\sqrt{(u^2+a^2)})+c$
$\int \frac{du}{(\sqrt{(u^2-a^2)})}=\cosh^{-1}(\frac{u}{a})+c=\ln(u+\sqrt{(u^2-a^2)})+c$
$\int \frac{du}{(a^2-u^2)}=\frac{1}{a}\tanh^{-1}(\frac{u}{a})+c=\frac{1}{2\mathrm{a}}\ln(\frac{(a+u)}{(a-u)})+c$
$\int \frac{du}{(u\sqrt{(a^2-u^2)})}=\frac{1}{a}sech^{-1}(u)+c$
$\int \frac{du}{(u\sqrt{(u^2+a^2)})}=\frac{1}{a}cosech^{-1}(\frac{u}{a})+c$

$\int \tan(u)\,du = \ln(sec(u)) + c$
$\int \cot(u)\,du = \ln(\sin(u)) + c$
$\int sec(u)\,du = \ln(sec(u) + \tan(u)) + c$
$\int cosec(u)\,du = -\ln(cosec(u) + \cot(u)) + c$
$\int \tan(u)\,du = \ln(\cosh(u)) + c$
$\int \coth(u)\,du = \ln(\sinh(u)) + c$
$\int sech(u)\,du = 2\tan^{-1}(e^{u}) + c$
$\int cosech(u)\,du = -2\coth^{-1}(e^{u}) + c$

Quadratic Equation

Equation Of The Second Degree

حلول معادلة من الدرجة الثانية : -

صورة المعادلة :

$$ax^2 + bx + c = 0$$

حيث ***a,b,c*** اى ثوابت

حلول المعادلة : -

$$x = -b \pm \frac{\sqrt{(b^2 - 4ac)}}{2a}$$

بعض القوانين الجبرية : -

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

$$(a \pm b)^3 = a^3 \pm 3a^2 * b + 3a * b^2 \pm b^3$$

$$a^2 - b^2 = (a - b)(a + b)$$

$$a^3+b^3=(a+b)(a^2-ab+b^2)$$

$$a^3-b^3=(a-b)(a^2+ab+b^2)$$

$$a^n-b^n=(a-b)(a^{(n-1)}+a^{(n-2)}b+a^{(n-3)}b^2+...+ab^{(n-2)}+b^{(n-1)})$$

<u>نظرية ذات الحدين : -</u>

$$(a+b)^n={}^nc_0\,a^n+{}^nc_1\,a^{(n-1)}b+{}^nc_2\,a^{(n-2)}b^2+{}^nc_3\,a^{(n-3)}b^3+...+{}^nc_n\,b^n$$ -

<u>حيث ***n*** عدد صحيح موجب</u>

-
$$(1\pm x)^n=1\pm{}^nc_1\,x+{}^nc_2\,x^2\pm{}^nc_3\,x^3+...,\ |x|<1$$

<u>حيث ***n*** هنا عدد صحيح سالب أو كسر موجب او كسر سالب حيث</u>

$${}^nc_r=\frac{n!}{[r!(n-r)!]}=\frac{[n(n-1)(n-2)...(n-r+1)]}{r!}$$

$$r!=r(r-1)(r-2)...3*2*1$$

$${}^np_r=\frac{n!}{(n-r)!}$$

<u>متسلسلة تيلور (مفكوك تيلور) ***Taylor Series*** :</u>

$$f(x)=f(a)+\frac{(x-a)}{1!}*\bar{f}(a)+\frac{(x-a)^2}{2!}\bar{\bar{f}}(a)+....$$

<u>لو وضعنا ***a=0*** فى المفكوك السابق</u>

$$f(x)=f(0)+\frac{x}{1!}\bar{f}(0)+\frac{x^2}{2!}\bar{\bar{f}}(0)+\ldots$$

حا لات خاصة : -

$$\frac{1}{(1\pm x)}=(1\pm x)^{-1}=1\mp x+x^2\mp x^3+\ldots,|x|<1$$

$$\sqrt{(1\pm x)}=(1\pm x)^{(\frac{1}{2})}=1\pm\frac{1}{2}x-\frac{1}{8}x^2\pm\frac{1}{16}x^3-\ldots,|x|<1$$

$$\frac{1}{\sqrt{(1\pm x)}}=(1\pm x)^{(\frac{1}{2})}=1\mp\frac{1}{2}x+\frac{3}{8}x^2\mp\frac{5}{16}x^3+\ldots.,|x|<1$$

متسلسة فورير ***Fourier Series*** : -

$$f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty}[a_n\cos(nx)+b_n\sin(nx)],(-\pi\le x\le\pi)$$

حيث ***f*** دالة دورية ***Periodic Function*** :

حيث ***a,b*** هى معاملات فورير

$$a_m=\frac{1}{\pi}\int_{-\pi}^{\pi}f(x)\cos(mx)\,dx$$

$$b_m=\frac{1}{\pi}\int_{-\pi}^{\pi}f(x)\sin(mx)\,dx,\ m=0,1,2,\ldots$$

** اذا كانت $f(x)=-f(x)$ ***Even Function*** دوال زوجية :

$$a_m=\frac{2}{\pi}\int_{0}^{\pi}f(x)\cos(mx)\,dx,\ b_m=0$$

<u>* *اذا كانت $f(x)=-f(x)$ **Odd Function** دوال فردية :</u>

$$a_m=0\,,b_m=\frac{2}{\pi}\int_0^{\pi} f(x)\sin(mx)\,dx$$

Even – Harmonic Function	***Odd – Harmonic Function***
$f(x)=f(-x)\,,\ f(x+\frac{\pi}{2})=-f(\frac{\pi}{2}-x)$ $a_m=\frac{4}{\pi}\int_0^{\frac{\pi}{2}} f(x)\cos(mx)\,dx$ $for\ m=1\,,2\,,3\,,5\,,7.....$ $a_m=0\ for\ m=0\,,2\,,4\,,6\,,...$ $b_m=0\ for\ m=1\,,2\,,3\,,4\,,....$	$f(x)=-f(-x)\,,\ f(x+\frac{\pi}{2})=-f(\frac{\pi}{2}-x)$ $b_m=\frac{4}{\pi}\int_0^{\frac{\pi}{2}} f(x)\sin(mx)\,dx$ $for\ m=1\,,3\,,5\,,7$ $a_m=0\ for\ m=0\,,1\,,2\,,3\,,....$ $b_m=0\ for\ m=2\,,4\,,6\,,....$

<u>***Integrals Containing Sin Function***</u>

$\int \sin(ax)\,dx = -(\frac{1}{a})\cos(ax) + c$
$\int \sin^2(ax)\,dx = (\frac{1}{2})x - (\frac{1}{4a})\sin(2ax) + c$
$\int \sin^3(ax)\,dx = -(\frac{1}{a})\cos(ax) + (\frac{1}{3a})\cos^3(ax) + c$
$\int \sin^4(ax)\,dx = (\frac{3}{8})x - (\frac{1}{4a})\sin(2ax) + (\frac{1}{32a})\sin(4ax) + c$
$\int \sin^n(ax)\,dx = \frac{-(\sin^{(n-1)}(ax)\cos(ax))}{na} + \frac{(n-1)}{n}\int \sin^{(n-2)}(ax)\,dx\ , n = integer > 0$
$\int xsinax\,dx = \frac{(sinax)}{a^2} - \frac{(x\,cosax)}{a} + c$
$\int x^2\sin(ax)\,dx = \frac{2x}{(a^2)}\sin(ax) - [\frac{x^2}{a} - \frac{2}{a^3}]\cos(ax) + c$
$\int x^3\sin(ax)\,dx = [\frac{3x^2}{a^2} - \frac{6}{a^4}]\sin(ax) - [\frac{x^3}{a} - \frac{6x}{a^3}]\cos(ax) + c$
$\int x^n\sin(ax)\,dx = \frac{-x^n}{a}\cos(ax) + \frac{n}{a}\int x^{(n-1)}\cos(ax)\,dx\ ,(n > 0)$
$\int \frac{(\sin(ax))}{a}dx = ax - \frac{(ax)^3}{3.3!} + \frac{(ax)^5}{5.5!} - \frac{(ax)^7}{7.7!} + ... + c$
$\int \frac{(\sin(ax))}{x^2}dx = \frac{-(\sin(ax))}{x} + a\int \frac{(\cos(ax))}{x}dx$
$\int \frac{(\sin(ax))}{x^n}dx = \frac{-1}{(n-1)} * [\frac{(\sin(ax))}{x^{(n-1)}}] + (\frac{a}{(n-1)}) * \int \frac{(\cos(ax))}{x^{(n-1)}}dx$
$\int \frac{dx}{(\sin ax)} = \frac{1}{a}\ln(\tan(\frac{ax}{2})) + c$
$\int \frac{dx}{(\sin^2(ax))} = \frac{-1}{a}\cot(ax) + c$
$\int \frac{dx}{(\sin^3(ax))} = \frac{-(\cos(ax))}{(2a\sin^2(ax))} + \frac{1}{(2a)}\ln(\tan(\frac{ax}{2})) + c$
$\int \frac{dx}{(\sin^n(ax))} = \frac{-1}{(a(n-1))}\frac{(\cos(ax))}{(\sin^{(n-1)}(ax))} + \frac{(n-2)}{(n-1)}\int \frac{dx}{(\sin^{(n-2)}(ax))}\ , n > 1$
$\int \frac{xdx}{(\sin ax)} = \frac{1}{(a^2)}(ax + \frac{(ax)^3}{3.3!} + 7\frac{(ax)^5}{3.5.5!} + 31\frac{(ax)^7}{3.7.7!} + 127\frac{(ax)^9}{3.5.9!} + ..) + c$
$\int \frac{xdx}{(\sin^2 ax)} = \frac{-x}{a}\cot ax + \frac{1}{a^2}\ln(\sin ax) + c$

$$\int \frac{xdx}{(\sin^n ax)} = \frac{-(x\cos ax)}{[(n-1)a\sin^{(n-1)}ax]} - [\frac{1}{((n-1)(n-2)a^2\sin^{(n-2)}ax)}] + [[\frac{(n-2)}{(n-1)}]\int \frac{xdx}{(\sin^{(n-2)}ax)}], (n>2)$$

$$\int \frac{dx}{(1+\sin ax)} = \frac{-1}{a}\tan[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \frac{dx}{(1-\sin ax)} = \frac{1}{a}\tan[\frac{\pi}{4}+\frac{ax}{2}]+c$$

$$\int \frac{xdx}{(1+sinax)} = \frac{-x}{a}\tan[\frac{\pi}{4}-\frac{ax}{2}]+\frac{2}{a^2}\ln\cos[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \frac{xdx}{(1-\sin ax)} = \frac{x}{a}\cot[\frac{\pi}{4}-\frac{ax}{2}]+\frac{2}{a^2}\ln(\sin[\frac{\pi}{4}-\frac{ax}{2}])+c$$

$$\int \frac{(\sin ax)}{(1\pm\sin ax)}dx = \pm x+\frac{1}{a}\tan[\frac{\pi}{4}\mp\frac{ax}{2}]+c$$

$$\int \frac{dx}{[\sin ax(1\pm\sin ax)]} = \frac{1}{a}\tan[\frac{\pi}{4}\mp\frac{ax}{2}]+\frac{1}{a}\ln(\tan\frac{ax}{2})+c$$

$$\int \frac{dx}{(1+\sin ax)^2} = \frac{-1}{2a}\tan[\frac{\pi}{4}-\frac{ax}{2}]-\frac{1}{6a}\tan^3[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \frac{dx}{(1-\sin ax)^2} = \frac{1}{2a}\cot[\frac{\pi}{4}-\frac{ax}{2}]+\frac{1}{6a}\cot^3[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \sin ax\frac{dx}{(1+\sin ax)^2} = \frac{-1}{2a}\tan[\frac{\pi}{4}-\frac{ax}{2}]+\frac{1}{6a}\tan^3[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \frac{(\sin ax)}{(1-\sin ax)^2}dx = \frac{-1}{2a}\cot[\frac{\pi}{4}-\frac{ax}{2}]+\frac{1}{6a}\cot^3[\frac{\pi}{4}-\frac{ax}{2}]+c$$

$$\int \frac{dx}{(1+\sin^2 ax)} = \frac{1}{(2\sqrt{(2a)})}\sin^{-1}[\frac{(3\sin^2 ax-1)}{(\sin^2 ax+1)}]+c$$

$$\int \frac{dx}{(1-\sin^2 ax)} = \frac{1}{a}\tan ax+c$$

$$\int \sin ax\sin bx\,dx = \frac{[\sin(a-b)x]}{[2(a-b)]}-[\frac{(\sin(a+b)x)}{(2(a+b))}]+c\ ,\ for:|a|\neq|b|$$

$$\int \frac{dx}{(b+c\sin ax)} = \frac{2}{(a\sqrt{(b^2-c^2)})}\tan^{-1}[\frac{(b\tan(\frac{ax}{2})+c)}{(\sqrt{(b^2-c^2)})}]+k$$

$for: b^2>c^2$

$$\frac{1}{(a\sqrt{(c^2-b^2)})}\ln[\frac{(b\tan(\frac{ax}{2})+c-\sqrt{(c^2-b^2)})}{(b\tan(\frac{ax}{2})+c+\sqrt{(c^2-b^2)})}]+k$$

$\int \frac{(\sin ax)}{(b+c\sin ax)}dx=\frac{x}{c}-\frac{b}{c}\sqrt{(\frac{dx}{(b+c\sin ax)})}$
$\int \frac{dx}{(b+c\sin ax)^2}=\frac{(c\cos ax)}{(a(b^2-c^2)(b+c\sin ax))}+\frac{b}{(b^2-c^2)}\int (\frac{dx}{(b+c\sin ax)})$
$\int \frac{(\sin ax)}{(b+c\sin ax)^2}dx=\frac{(b\cos ax)}{(a(c^2-b^2)(b+c\sin ax))}+\frac{c}{(c^2-b^2)}\int \frac{dx}{(b+c\sin ax)}+c$
$\int \sin px\sin^n x\,dx=\frac{-(\sin^n x\cos px)}{p}+\frac{n}{2\mathrm{p}}\int \sin^{(n-1)}x\cos(p-1)x\,dx+\frac{n}{2\mathrm{p}}\int \sin^{(n-1)}x\cos(p+1)x\,dx$
$\int \frac{(\sin x)}{(\sqrt{(a^2+b^2\sin^2 x)})}dx=\frac{-1}{b}\sin^{-1}\frac{(b\cos x)}{\sqrt{(a^2+b^2)}}+c$
$\int \frac{(\sin x)}{(\sqrt{(a^2-b^2)}\sin^2 x)}dx=\frac{-1}{b}\ln\left\|(bcos\,x+\sqrt{(a^2-b^2\sin^2 x)})\right\|+c$
$\int \sin x\sqrt[[]]{(a^2+b^2\sin^2 x)}dx=-\cos\frac{x}{2}\sqrt{(a^2+b^2\sin^2 x)}-\frac{(a^2+b^2)}{2\mathrm{b}}\sin^{-1}(\frac{(b\cos x)}{(\sqrt{(a^2+b^2)})})+c$
$\int \sin x\sqrt{(a^2-b^2\sin^2 x)}dx=\frac{-(\cos x)}{2}\sqrt{(a^2-b^2\sin^2 x)}-\frac{(a^2-b^2)}{2\mathrm{b}}\ln\left\|(bcosx+\sqrt{(a^2-b^2\sin^2 x)})\right\|+c$
$\int \frac{(\sin 2\mathrm{x})}{(sinx)}dx=2\,sinx+c$
$\int \frac{(sin2x)}{(\sin^2 x)}dx=2\ln\,sinx+c$
$\int \frac{(sin2x)}{(\sin^3 x)}dx=\frac{-2}{(sinx)}+c$
$\int \frac{(sin2x)}{(\sin^n x)}dx=\frac{-2}{((n-2)\sin^{(n-2)}x)}+c\,,n\geq 3$
$\int \frac{(sinx)}{(sin2x)}dx=\frac{1}{2}\ln\left\|(\cot(\frac{x}{2}-\frac{\pi}{4}))\right\|+c$
$\int \frac{(\sin^2 x)}{(sin2x)}dx=\frac{-1}{2}\ln\|(cosx)\|+c$
$\int \frac{(\sin^3 x)}{(sin2x)}dx=\frac{-1}{2}\ln\left\|(\cot(\frac{x}{2}-\frac{\pi}{4}))\right\|-\frac{1}{2}\sin x+c$
$\int \frac{(sin3x)}{(sinx)}dx=x+sin2x+c$
$\int \frac{(\sin 3\mathrm{x})}{(\sin^2)}dx=3\ln\left\|(\tan(\frac{x}{2}))\right\|+4\cos\mathrm{x}+c$
$\int \frac{(sin3x)}{(\sin^3)}dx=-3\cot\mathrm{x}-4\mathrm{x}+c$

Integrals Containing Cos Function

$\int \cos ax\,dx = \frac{1}{a}\sin ax + c$
$\int \cos^3 ax\,dx = \frac{1}{a}\sin ax - \frac{1}{3a}\sin^3 ax + c$
$\int \cos^3 ax\,dx = \frac{1}{a}\sin ax - \frac{1}{3a}\sin^3 ax + c$
$\int \cos^4 ax\,dx = \frac{3}{8}x + \frac{1}{4a}\sin 2ax + \frac{1}{32a} sin4ax + c$
$\int \cos^n ax\,dx = \frac{(\cos^{(n-1)} ax \sin ax)}{na} + \frac{(n-1)}{n}\int \cos^{(n-2)} ax\,dx$
$\int x\cos ax\,dx = \frac{(\cos ax)}{a^2} + \frac{(x\sin ax)}{a} + c$
$\int x^2\cos ax\,dx = \frac{2x}{a^2}\cos ax + [\frac{x^2}{a} - \frac{2}{a^3}]\sin ax + c$
$\int x^3\cos ax\,dx = [\frac{3x^2}{a^2} - \frac{6}{a^4}]\cos ax + [\frac{x^3}{a} - \frac{6x}{a^3}]\sin ax + c$
$\int x\,6\,n\cos ax\,dx = \frac{(x^n\sin ax)}{a} - \frac{n}{a}\int x^{(n-1)}\sin ax\,dx$
$\int \frac{cosax}{x}dx = \ln(ax) - \frac{(ax)^2}{2.2!} + \frac{(ax)^4}{2.2!} - \frac{(ax)^6}{6.6!} + ... + c$
$\int \frac{(\cos ax)}{x^2}dx = \frac{-(\cos ax)}{x} - a\int \frac{(sinax)}{x}dx$
$\int \frac{(\cos ax)}{x^n}dx = \frac{-(\cos ax)}{[(n-1)x^{(n-1)}]} - \frac{a}{(n-1)}\int \frac{(sinax)}{x^{(n-1)}}dx\ ,\ for: n \neq 1$
$\int \frac{dx}{(cosax)} = \frac{1}{a}\ln[\tan(\frac{ax}{2} + \frac{\pi}{4})] + c$
$\int \frac{dx}{(\cos^2 ax)} = \frac{1}{a}\tan ax + c$
$\int \frac{dx}{(\cos^{3ax})} = \frac{(\sin ax)}{(2a\cos^{2ax})} + \frac{1}{2a}\ln[\tan(\frac{\pi}{4} + \frac{ax}{2})] + c$
$\int \frac{dx}{\cos^n}ax = \frac{1}{(a(n-1))} * (\frac{(sinax)}{(\cos^{(n-1)} ax)}) + \frac{(n-2)}{(n-1)}\int \frac{dx}{(\cos^{(n-2)} ax)}\ for: n > 1$
$\int \frac{xdx}{(cosax)} = \frac{1}{a^2} * [\frac{(ax)^2}{2} + \frac{(ax)^4}{4.2!} + 5\frac{(ax)^6}{6.4!} + 61\frac{(ax)^8}{8.6!} + 1385\frac{(ax)^{10}}{10.8!} + ...] + c$
$\int \frac{xdx}{(\cos^2 ax)} = \frac{x}{a}\tan ax + \frac{1}{a^2}\ln\cos ax + c$
$\int \frac{dx}{(1+\cos ax)} = \frac{1}{a}\tan(\frac{ax}{2}) + c$
$\int \frac{dx}{(1-cosax)} = \frac{-1}{a}\cot(\frac{ax}{2}) + c$
$\int \frac{xdx}{(1+cosax)} = \frac{x}{a}\tan(\frac{ax}{2}) + \frac{2}{a^2}\ln(\cos\frac{ax}{2}) + c$

$\int \frac{(cosax)}{(1+cosax)} = x - \frac{1}{a}\tan\left(\frac{ax}{2}\right) + c$
$\int \frac{(\cos ax)}{(1-cosax)} dx = -x - \frac{1}{a}\cot\frac{ax}{2} + c$
$\int \frac{dx}{(cosax(1+cosax))} = \frac{1}{a}\ln\left(\tan\left[\frac{\pi}{4}+\frac{ax}{2}\right]\right) - \frac{1}{a}\tan\frac{ax}{2} + c$
$\int \frac{dx}{(\cos ax(1-cosax))} = \frac{1}{a}\ln\left(\tan\left[\frac{\pi}{4}+\frac{ax}{2}\right]\right) - \frac{1}{a}\cot\left(\frac{ax}{2}\right) + c$
$\int \frac{dx}{(1+cosax)^2} = \frac{1}{2a}\tan\frac{ax}{2} - \frac{1}{6a}\tan^3\frac{ax}{2} + c$
$\int \frac{dx}{(1-cosax)^2} = \frac{-1}{2a}\cot\frac{ax}{2} - \frac{1}{6a}\cot^3\frac{ax}{2} + c$
$\int \frac{(cosax)}{(1+cosax)^2} dx = \frac{1}{2a}\tan\frac{ax}{2} - \frac{1}{6a}\tan^3\frac{ax}{2} + c$
$\int \frac{dx}{(1+\cos^2 ax)} = \frac{1}{(2\sqrt{(2a)})}\sin^{-1}\left[\frac{(1-3\cos^2 ax)}{(1+\cos^2 ax)}\right] + c$
$\int \frac{dx}{(1-\cos^2 ax)} = \frac{-1}{a}\cot ax + c$
$\int \cos ax \cos bx\, dx = \frac{(\sin(a-b)x)}{(2(a-b))} + \frac{(\sin(a+b)x)}{(2(a+b))} + k \ for: \lvert a\rvert \neq \lvert b\rvert$
$\int \frac{dx}{(b+c\cos ax)} = \frac{2}{(a\sqrt{(b^2-c^2)})}\tan^{-1}\left[\frac{((b-c)\tan(\frac{ax}{2}))}{(\sqrt{(b^2-c^2)})}\right] + k$ $for: b^2 > c^2 = \frac{1}{(a\sqrt{(c^2-b^2)})}\ln\left[\frac{((c-b)\tan(\frac{ax}{2})+\sqrt{(c^2-b^2)})}{((c-b)\tan(\frac{ax}{2})-\sqrt{(c^2-b^2)})}\right] + k$
$\int \frac{(\cos ax)}{(b+c\cos ax)} dx = \frac{x}{x} - \frac{b}{c}\int \frac{dx}{(b+c\cos ax)}$
$\int \frac{dx}{(\cos ax(b+c\cos ax))} = \frac{1}{ab}\ln\left(\tan\left[\frac{ax}{2}+\frac{\pi}{4}\right]\right) - \frac{a}{b}\int \frac{dx}{(b+c\cos ax)}$
$\int \frac{dx}{(b+c\cos ax)^2} = \frac{(c\sin ax)}{[a(c^2-b^2)(b+c\cos ax)]} - \frac{b}{(c^2-b^2)}\int \frac{dx}{(b+c\cos ax)}$
$\int \frac{(cosax)}{(b^2+c\cos ax)^2} = \frac{(b\,sinax)}{[a(b^2-c^2)(b+c\,cosax)]} - \frac{c}{(b^2-c^2)}\int \frac{dx}{(b+c\cos ax)}$
$\int \frac{dx}{(b^2+c^2\cos^2 ax)} = \frac{1}{(ab\sqrt{(b^2+c^2)})}\tan^{-1}\frac{(b\tan ax)}{\sqrt{(b^2+c^2)}} + k$
$\int \frac{dx}{(b^2-c^2\cos^2 ax)} = \frac{1}{(ab\sqrt{(b^2-c^2)})} + k$ $for\ b^2 > c^2 = \frac{1}{(2ab\sqrt{(c^2-b^2)})}\ln\left[\frac{(b\tan ax-\sqrt{(c^2-b^2)})}{(b\tan ax+\sqrt{(c^2-b^2)})}\right] + k$
$\int \cos ax \cos^n x\, dx = \frac{(\cos^n x \sin ax)}{a} + \frac{n}{2a}\int \cos^{(n-1)} x \cos(a-1)x dx - \frac{n}{2a}\int \cos^{(n-1)} x \cos(a+1)x dx$
$\int \frac{(cosx)}{(\sqrt{(a^2+b^2\cos^2 x)})} dx = \left(\frac{1}{b}\right)\sin^{-1}\left(\frac{(b\,sinx)}{(\sqrt{(a^2+b^2)})}\right) + k$

$\int \frac{(\cos x\, dx)}{(\sqrt{(a^2-b^2\cos^2 x)})}=\frac{1}{b}\ln\left\|(b\sin x+\sqrt{(a^2-b^2\cos^2 x)})\right\|+k$
$\int cosx\sqrt{(a^2+b^2\cos^2 x)}\,dx=\frac{sinx}{2}\sqrt{(a^2+b^2\cos^2 x)}+\frac{(a^2+b^2)}{2b}\sin^{-1}\frac{(b\,sinx)}{(\sqrt{(a^2+b^2)})}+k$
$\int \frac{(\cos 2x)}{(\cos x)}dx=2\sin x-\ln\left\|(\tan(\frac{\pi}{4}+\frac{x}{2}))\right\|+c$
$\int \frac{(\cos 2x)}{(\cos x)}dx=2\sin x-\ln\left\|(\tan(\frac{\pi}{4}+\frac{x}{2}))\right\|+c$
$\int \frac{(\cos 2x)}{(\cos^2 x)}dx=2x-\tan x+c$
$\int \frac{(\cos 2x)}{(\cos^3 x)}dx=\frac{-(\sin x)}{(2\cos^2 x)}+\frac{3}{2}\ln\left\|(\tan(\frac{\pi}{4}+\frac{x}{2}))\right\|+c$
$\int \frac{(\cos 2x)}{(\cos^n x)}dx=\frac{-(\sin x)}{((n-1)\cos^{-1} x)}+\frac{n}{(n-1)}\int \frac{dx}{(\cos^{(n-2)} x)}$
$\int \frac{(\cos^2 x)}{(\cos 2x)}dx=\frac{x}{2}-\frac{1}{4}\ln\left\|(\frac{(1-\tan x)}{(1+\tan x)})\right\|+c$
$\int \frac{(\cos^3 x)}{(\cos 2x)}dx=\frac{1}{2}\sin x+\frac{1}{(4\sqrt{(2)})}\ln\left\|(\frac{(1-\sqrt{(2)}sinx)}{(1+\sqrt{(2)}sinx)})\right\|+c$
$\int \frac{(\cos^n x)}{(\cos 2x)}dx=\frac{1}{2}\int \cos^{(n-2)} x\,dx+\frac{1}{2}\int \frac{(\cos^{(n-2)} x)}{(cos2x)}dx$
$\int \frac{(\cos 3x)}{(cosx)}dx=\sin 2x-x+c$
$\int \frac{(cos3x)}{(\cos^2 x)}dx=4\sin x-3\ln\left\|(\tan(\frac{\pi}{4}+\frac{x}{2}))\right\|+c$
$\int \frac{(\cos 3x)}{(\cos^3 x)}dx=4x-3\tan x+c$
$\int \frac{(\cos 3x)}{(\cos^n)}dx=4\int \frac{dx}{(\cos^{(n-3)} x)}-3\int \frac{dx}{(\cos^{(n-1)} x)}$

Integrals Containing Sin & Cos Function

1. $\int \sin ax \cos ax\, dx = \frac{1}{2a} \sin^2 ax + c$
2. $\int \sin^2 ax \cos^2 ax\, dx = \frac{x}{8} - \frac{(\sin 4ax)}{32a} + c$
3. $\int \sin^n ax \cos ax\, dx = \frac{1}{(a(n+1))} \sin^{(n+1)} ax + c \;\; for : n \neq -1$
4. $\int \sin^n ax \cos^n ax\, dx = -(\frac{1}{(a(n+1))}) \cos^{(n+1)} ax + c \;\; for : n \neq -1$
5. $\int \sin^n ax \cos^m ax\, dx = \frac{-((\sin^{(n-1)} ax \cos^{(m+1)} ax))}{(a(n+m))} + \frac{(n-1)}{(n+m)} \int \sin^{(n-2)} ax \cos^m ax\, dx$ $for : m>0 , n>0 = \frac{(\sin^{(n+1)} ax \cos^{(m-1)} ax)}{(a(n+m))} + \frac{(m-1)}{(n+m)} \int \sin^n ax \cos^{(m-2)} ax\, dx \, , \; for : m>0 , n>0$
$\int \frac{dx}{(\sin ax \cos ax)} = \frac{1}{a} \ln \tan ax + c$
$\int \frac{dx}{(\sin^2 ax \cos ax)} = \frac{1}{a} [\ln \tan [\frac{\pi}{4} + \frac{ax}{2}] - \frac{1}{(\sin ax)}] + c$
$\int \frac{dx}{(\sin ax \cos^2 ax)} = \frac{1}{a} (\ln \tan (\frac{ax}{2}) + (\frac{1}{\cos} ax)) + c$
$\int \frac{dx}{(\sin^3 ax \cos ax)} = \frac{1}{a} (\ln \tan ax - (\frac{1}{(2\sin^2 ax)})) + c$
$\int \frac{dx}{(\sin ax \cos^3 ax)} = \frac{1}{a} (\ln \tan ax + \frac{1}{(2\cos^2 ax)}) + c$
$\int \frac{dx}{(\sin^2 ax \cos^2 ax)} = \frac{-2}{a} \cot 2ax + c$
$\int \frac{dx}{(\sin^2 ax \cos^3 ax)} = \frac{1}{a} \{ \frac{(\sin ax)}{(2\cos^2 ax)} - \frac{1}{(\sin ax)} + \frac{3}{2} \ln \tan [\frac{\pi}{4} + \frac{ax}{2}]\} + c$
$\int \frac{dx}{(\sin^3 ax \cos^2 ax)} = \frac{1}{a} (\frac{1}{(\cos ax)} - \frac{(\cos ax)}{(2\sin^2 ax)} + \frac{3}{2} \ln \tan \frac{ax}{2}) + c$
$\int \frac{dx}{(\sin ax \cos^n ax)} = \frac{1}{(a(n-1)\cos^{(n-1)} ax)} + \int \frac{dx}{(\sin ax \cos^{(n-2)} ax)} \;\; for : n \neq 1$
$\int \frac{dx}{(\sin^n ax \cos ax)} = -(\frac{1}{(a(n-1)\sin^{(n-1)} ax)}) + \int \frac{dx}{(\sin^{(n-2)} ax \cos ax)} \;\; for : n \neq 1$
$\int \frac{dx}{(\sin^n ax \cos^m ax)} = -(\frac{1}{(a(n-1))} . \frac{1}{(\sin^{(n-1)} ax \cos^{(m-1)} ax)}) + \frac{(n+m-2)}{(n-1)} \int \frac{dx}{(\sin^{(n-2)} ax \cos^m ax)}$ $\frac{1}{(a(m-1))} . \frac{1}{(\sin^{(n-1)} ax \cos^{(m-1)} ax)} + \frac{(n+m-2)}{(m-1)} \int \frac{dx}{(\sin^n ax \cos^{(m-2)} ax)} \;\; for : n>0 , m>1$
$\int \frac{(\sin ax\, dx)}{(\cos^2 ax)} = \frac{1}{a} sec\, ax + c$

$\int \frac{(\sin ax)}{(\cos^n ax)} dx = \frac{1}{(a(n-1)\cos^{(n-1)} ax)} + c$
$\int \frac{(\sin^2 ax)}{(\cos ax)} dx = \frac{-1}{a}(\sin ax) + \frac{1}{a}\ln\tan[\frac{\pi}{4} + \frac{ax}{2}] + c$
$\int \frac{(\sin^2 ax)}{(\cos^3 ax)} dx = \frac{1}{a}\{\frac{(\sin ax)}{(2\cos^2 ax)} - \frac{1}{a}\ln\tan[\frac{\pi}{4} + \frac{ax}{2}]\}$
$\int \frac{(\sin^2 ax)}{(\cos^n ax)} dx = \frac{(\sin ax)}{(a(n-1)\cos^{(n-1)} ax)} - \frac{1}{(n-1)}\int \frac{dx}{(\cos^{(n-2)} ax)}$
$\int \frac{(\sin^3 ax)}{(\cos ax)} dx = \frac{-1}{a}[\frac{(\sin^2 ax)}{2} + \ln\cos ax] + c$
$\int \frac{(\sin^3 ax)}{(\cos^2 ax)} dx = \frac{1}{a}[\cos ax + \frac{1}{(\cos ax)}] + c$
$\int \frac{(\sin^3 ax)}{(\cos^n ax)} dx = \frac{1}{a}\{\frac{1}{((n-1)\cos^{(n-1)} ax)} - \frac{1}{((n-3)\cos^{(n-3)} ax)}\} + c$
$\int \frac{(\sin^n ax)}{(\cos ax)} dx = \frac{-(\sin^{(n-1)} ax)}{(a(n-1))} + \int \frac{(\sin^{(n-2)} ax)}{(\cos ax)} dx$
$\int \frac{(\cos ax)}{(\sin^n ax)} dx = \frac{-1}{(a(n-1)\sin^{(n-1)} ax)} + c$
$\int \frac{(\cos^2 ax)}{(\sin ax)} dx = \frac{1}{a}(\cos ax + \ln\tan(\frac{ax}{2})) + c$
$\int \frac{(\cos^2 ax)}{(\sin^3 ax)} dx = \frac{-1}{2\text{a}}[\frac{(\cos ax)}{(\sin^2 ax)} - \ln\tan\frac{(ax)}{2}] + c$
$\int \frac{(\cos^2 ax)}{(\sin^n ax)} dx = \frac{-1}{(n-1)}[\frac{(\cos ax)}{(a\sin^{-1} ax)} + \int \frac{dx}{(\sin^{(n-2)} ax)}]$
$\int \frac{(\cos^3 ax)}{(\sin ax)} dx = \frac{1}{a}[\frac{(\cos^2 ax)}{2} + \ln\sin ax] + c$
$\int \frac{(\cos^3 ax)}{(\sin^2 ax)} dx = \frac{-1}{a}[\sin ax + \frac{1}{(\sin ax)}] + c$
$\int \frac{(\cos^3 ax)}{(\sin^n ax)} dx = \frac{1}{a}[\frac{1}{((n-3)\sin^{(n-2)} ax)} - \frac{1}{((n-1)\sin^{(n-1)} ax)}] + c$
$\int \frac{(\cos^n ax)}{(\sin ax)} dx = \frac{(\cos^{(n-1)} ax)}{(a(n-1))} + \int \frac{(\cos^{(n-2)} ax)}{(\sin ax)} dx$

Integrals Containing Tan& Cot Function

$\int \tan ax\, dx = \frac{-1}{a} \ln \cos ax + c$
$\int \tan^3 ax\, dx = \frac{1}{2a} \tan^3 ax + \frac{1}{a} \ln \cos ax + c$
$\int \tan^3 ax\, dx = \frac{1}{2a} \tan^3 ax + \frac{1}{a} \ln \cos ax + c$
$\int \tan^n ax\, dx = \frac{1}{(a(n-1))} \tan^{(n-1)} ax - \int \tan^{(n-2)} ax\, dx$
$\int x \tan ax\, dx = \frac{(a x^3)}{3} + \frac{(a^3 x^5)}{15} + \frac{(2 a^2 x^7)}{105} + \frac{(17 a^7 x^9)}{2835} + \ldots + c$
$\int \frac{(\tan ax)}{x} dx = ax + \frac{(ax)^3}{9} + 2\frac{(ax)^5}{75} + 17\frac{(ax)^7}{2205} + \ldots + c$
$\int \frac{(\tan^n ax)}{(\cos^2 ax)} dx = \frac{1}{(a(n+1))} \tan^{(n+1)} ax + c$
$\int \frac{dx}{(\tan ax \pm 1)} = \pm(\frac{x}{2}) + \frac{1}{2a} \ln(\sin ax \pm \cos ax) + c$
$\int \frac{(\tan ax)}{(\tan ax \pm 1)} dx = (\frac{x}{2}) \mp (\frac{1}{2a}) \ln(\sin ax \pm \cos ax) + c$
$\int \frac{(\tan ax)}{(a + B \tan x)} = \frac{1}{(a^2 + B^2)} (Bx - aln\|(acosx + Bsinx)\|) + c$
$\int \frac{dx}{(1 + \tan^2 x)} = \frac{x}{2} + \frac{1}{4} \sin 2x + c$
$\int \frac{dx}{(a^2 + B^2 \tan^2 x)} = \frac{1}{(a^2 - B^2)} \{(x - \|(\frac{B}{a})\| \tan^{-1}[\|(\frac{B}{a})\| \tan x])\}$
$\int \frac{dx}{(a^2 - B^2 \tan^2 x)} = \frac{1}{(a^2 + B^2)} [x + \frac{B}{2a} \ln\|(\frac{(a + B \tan x)}{(a - B \tan x)})\|] + k$
$\int \frac{(\tan x)}{(1 + \tan^2 x)} dx = \frac{-(\cos^2 x)}{2} + c$
$\int \frac{(\tan x)}{(1 + a^2 \tan^2 x)} = \ln \frac{(\cos^2 x + a^2 \sin^2 x)}{(2(a^2 - 1))} + k$
$\int \cot ax\, dx = \frac{1}{a} \ln \sin ax + c$

$\int \cot^2 ax\,dx = \frac{-(\cot ax)}{a} - x + c$
$\int \cot^3 ax\,dx = \frac{-1}{2a}\cot^2 ax - \frac{1}{a}\ln\sin ax + c$
$\int \cot^n ax\,dx = \frac{-1}{(a(n-1))}\cot^{(n-1)} ax - \int \cot^{(n-2)} ax\,dx$

Integrals Containing $\sin^{-1}$ & $\cos^{-1}$ Function

$\int \sin^{-1}\frac{x}{a}\,dx = x\sin^{-1}\frac{x}{a} + \sqrt{(a^2-x^2)} + c$
$\int x\sin^{-1}\frac{x}{a}\,dx = [\frac{x^2}{2} - \frac{a^2}{4}]\sin^{-1}\frac{x}{a} + \frac{x}{4}\sqrt{(a^2-x^2)} + c$
$\int x62\sin^{-1}\frac{x}{a}\,dx = \frac{x^3}{3}\sin^{-1}\frac{x}{a} + \frac{1}{9}(x^2+2a^2)\sqrt{(a^2-x^2)} + c$
$\int \frac{(\sin^{-1}\frac{x}{a})}{x}\,dx = \frac{x}{a} + \frac{1}{2.3.3}*(\frac{x^3}{a^3}) + \frac{1.3}{2.4.5.5}*(\frac{x^5}{a^5}) + \frac{1.3.5}{2.4.6.7.7}*(\frac{x^7}{a^7}) + ... + c$
$\int \frac{(\sin^{-1}\frac{x}{a})}{x^2}\,dx = \frac{-1}{x}\sin^{-1}\frac{x}{a} - \frac{1}{a}\ln(\frac{(a+\sqrt{(a^2-x^2)})}{x}) + c$
$\int x^3\sin^{-1}\frac{x}{a}\,dx = \frac{(8x^4-3a^4)}{32}\sin^{-1}\frac{x}{a} + \frac{(2x63+3xa^2)}{32}\sqrt{(a^2-x^2)} + c$
$\int x^4\sin^{-1}\frac{x}{a}\,dx = \frac{(x^5)}{5}\sin^{-1}\frac{x}{a} + [\frac{(3x^4+4x^2a^2+8a^2)}{75}].\sqrt{(a^2-x^2)} + c$
$\int x^n\sin^{-1}\frac{x}{a}\,dx = \frac{x^{(n+1)}}{(n+1)}\sin^{-1}\frac{x}{a} - \frac{1}{(n+1)}\int(\frac{x^{(n+1)}}{\sqrt{(a^2-x^2)}})\,dx$
$\int \frac{1}{x^n}\sin^{-1}\frac{x}{a}\,dx = \frac{-(\sin^{-1}\frac{x}{a})}{((n-1)x^{(n-1)})} + \frac{1}{(n-1)}\int \frac{dx}{[(x^{(n-1)})\sqrt{(a^2-x^2)}]}$

$\int \cos^{-1}\frac{x}{a}dx=[\frac{x^2}{2}-\frac{a^2}{4}]\cos^{-1}\frac{x}{a}-\frac{x}{4}\sqrt{(a^2-x^2)}+c$
$\int x\cos^{-1}\frac{x}{a}dx=[\frac{x^2}{2}-\frac{a^2}{4}]\cos^{-1}\frac{x}{a}-\frac{x}{4}\sqrt{(a^2-x^2)}+c$
$\int x^2\cos^{-1}\frac{x}{a}dx=\frac{x^3}{3}\cos^{-1}\frac{x}{a}-\frac{1}{9}(x^2+2a^2)\sqrt{(a^2-x^2)}+c$
$\int\frac{(\cos^{-1}\frac{x}{a})}{x}dx=\frac{\pi}{2}\ln x-\frac{x}{a}-\frac{1}{2.3.3}*(\frac{x^3}{a^3})-\frac{1.3}{2.4.5.5}(\frac{x^5}{a^5})-\frac{1.3.5}{2.4.6.7.7}(\frac{x^7}{a^7})-...+c$
$\int\frac{(\cos^{-1}\frac{x}{a})}{x^2}dx=\frac{-1}{x}\cos^{-1}\frac{x}{a}+\frac{1}{a}\ln\frac{(a+\sqrt{(a^2-x^2)})}{x}+c$

Integrals Containing $\tan^{-1}$ & $\cot^{-1}$ Function

$\int\tan^{-1}\frac{x}{a}dx=x\tan^{-1}\frac{x}{a}-\frac{a}{2}\ln(a^2+x^2)+c$
$\int x\tan^{-1}\frac{x}{a}dx=\frac{1}{2}(x^2+a^2)\tan^{-1}\frac{x}{a}-\frac{ax}{2}+c$
$\int x^2\tan^{-1}\frac{x}{a}dx=\frac{x^3}{3}\tan^{-1}\frac{x}{a}-a\frac{x^2}{6}+\frac{a^3}{6}\ln(x^2+a^2)+c$
$\int x^n\tan^{-1}\frac{x}{a}dx=\frac{(x^{(n+1)})}{(n+1)}\tan^{-1}\frac{x}{a}-\frac{a}{(n+1)}\int(\frac{x^{(n+1)}}{(a^2+x^2)})$
$\int\frac{(\tan^{-1}\frac{x}{a})}{x}dx=\frac{x}{a}-\frac{x^3}{(3^2a^5)}+\frac{x^5}{(5^5a^5)}-\frac{x^7}{(7^2a^2)}+..+c$
$\int\frac{(\tan^{-1}\frac{x}{a})}{x^2}dx=\frac{-1}{x}\tan^{-1}\frac{x}{a}-\frac{1}{2a}\ln\frac{(a^2+x^2)}{x^2}+c$
$\int\frac{(\tan^{-1}\frac{x}{a})}{x^n}dx=\frac{-1}{((n-1)x^{(n-1)})}\tan^{-1}\frac{x}{a}+\frac{a}{(n-1)}\int\frac{dx}{(x^{(n-1)}(a^2+x^2))}$

$\int \frac{(x^2 \tan^{-1})}{(1+x^2)} dx = x \tan^{-1} x - \frac{1}{2} \ln(1-x^2) - \frac{1}{2} (\tan^{-1} x)^2 + c$
$\int \frac{(x^3 \tan^{-1} x)}{(1+x^2)} dx = \frac{-1}{2} x + \frac{1}{2} (1+x^2) \tan^{-1} x - \int \frac{(x \tan^{-1} x)}{(1+x^2)} dx$
$\int \frac{(x^4 \tan^{-1} x)}{(1+x^2)} dx = \frac{-1}{6} x^2 + \frac{2}{3} \ln(1+x^2) + (\frac{(x^3)}{6} - x) \tan^{-1} x + \frac{1}{2} (\tan^{-1} x)^2 + c$
$\int \frac{(x \tan^{-1})}{(\sqrt{(1-x^2)})} dx = -\sqrt{(1-x^2)} \tan^{-1} x + \sqrt{(2)} \tan^{-1} (\frac{(x \sqrt{(2)})}{(\sqrt{(1-x^2)})}) - \sin^{-1} x + c$
$\int \frac{(\tan^{-1} x)}{(\alpha+\beta x)^2} dx = \frac{1}{(\alpha^2+\beta^2)} [\ln \left\| (\frac{(\alpha+\beta x)}{(\sqrt{(1+x^2)})}) \right\| - \frac{(\beta-\alpha x)}{(\alpha+\beta x)} \tan^{-1} x] + c$
$\int \cot^{-1} \frac{x}{a} dx = x \cot^{-1} \frac{x}{a} + \frac{a}{2} \ln(a^2+x^2) + c$
$\int x \cot^{-1} \frac{x}{a} dx = \frac{1}{2} (x^2+a^2) \cot^{-1} \frac{x}{2} + \frac{ax}{2} + c$
$\int x^2 \cot^{-1} \frac{x}{a} dx = \frac{(x^3)}{3} \cot^{-1} \frac{x}{a} + \frac{(a x^2)}{6} - \frac{(a^3)}{6} \ln(x^2+a^2) + c$

Integrals Containing sec^{-1} & $cosec^{-1}$ Function

$\int sec^{-1} \frac{x}{a} dx = x\, sec^{-1}\, x over\, a - a \ln \left\| (x+\sqrt{(x^2-a^2)}) \right\| + c \; for: 0 < sec^{-1} \frac{x}{a} < \frac{\pi}{2}$ $x\, sec^{-1} \frac{x}{a} + a \ln \left\| (x+\sqrt{(x^2-a^2)}) \right\| + c \; for: \frac{\pi}{2} < sec^{-1} \frac{x}{2} < \pi$
$\int x\, sec^{-1} \frac{x}{a} dx = \frac{x^2}{2} sec^{-1} \frac{x}{a} - (\frac{a}{2}) \sqrt{(x^2-a^2)} + c \; for: 0 < sec^{-1} \frac{x}{a} < \frac{\pi}{2}$ $\frac{x^2}{2} sec^{-1} \frac{x}{a} + (\frac{a}{2}) \sqrt{(x^2-a^2)} + c \; for: \frac{\pi}{2} < sec^{-1} \frac{x}{a} < \pi$
$\int x^2\, sec^{-1} \frac{x}{a} dx = \frac{x^3}{3} sec^{-1} \frac{x}{a} - \frac{ax}{6} \sqrt{(x^2-a^2)} + \frac{a^3}{6} \ln \left\| (x+\sqrt{(x^2-a^2)}) \right\| + c, \; 0 < sec^{-1} \frac{x}{a} < \frac{\pi}{2}$ $\frac{x^3}{3} sec^{-1} \frac{x}{a} + \frac{ax}{6} \sqrt{(x^2-a^2)} + \frac{a^3}{6} \ln \left\| (x+\sqrt{(x^2-a^2)}) \right\| + c, \; \frac{\pi}{2} < sec^{-1} \frac{x}{a} < \pi$

$\int x^n sec^{-1}\frac{x}{a}dx=\frac{(x^{(n+1)})}{(n+1)}sec^{-1}\frac{x}{a}-\frac{a}{(n+1)}\int\frac{(x^n)}{\sqrt{(x^2-a^2)}}dx\,,0<sec^{-1}\frac{x}{a}<\frac{\pi}{2}$ $\frac{x^{(n+1)}}{(n+1)}sec^{-1}\frac{x}{a}+\frac{a}{(n+1)}\int\frac{(x^n)}{\sqrt{(x^2-a^2)}}dx\,,\frac{\pi}{2}<sec^{-1}\frac{x}{a}<\pi$
$\int\frac{1}{x}sec^{-1}\frac{x}{a}dx=\frac{\pi}{2}\ln\lvert x\rvert+\frac{a}{x}+\frac{(a^3)}{2.3.3.x^3}+\frac{(1.3.a^5)}{2.4.5.5.x^5}+\frac{(1.3.5.a^7)}{2.4.6.7.7.x^7}+..+c$
$\int\frac{1}{x^2}sec^{-1}\frac{x}{a}dx=\frac{\sqrt{(x^2-a^2)}}{ax}-\frac{1}{x}sec^{-1}\frac{x}{a}+c$
$\int\frac{1}{x^3}sec^{-1}\frac{x}{a}dx=\frac{-1}{(2x^2)}sec^{-1}\frac{x}{a}+\frac{\sqrt{(x^2-a^2)}}{(4a\,x^2)}+\frac{1}{(4a^2)}\cos^{-1}\left\lvert(\frac{x}{a})\right\rvert+c$

Integrals Containing Hyperbolic Functions

$\int\sinh ax\,dx=\frac{-1}{a}\cosh ax+c$
$\int\cosh ax\,dx=\frac{1}{a}\sinh ax+c$
$\int\sinh^2 ax\,dx=\frac{1}{2a}\sinh ax\cosh ax-\frac{1}{2}x+c$
$\int\cosh^2 ax\,dx=\frac{1}{2a}\sinh ax\cosh ax+\frac{1}{2}x+c$
$\int\sinh^n ax\,dx=\frac{1}{an}\sinh^{(n-1)}ax\cosh ax-\frac{(n-1)}{n}\int\sinh^{(n-2)}ax\,dx\;for:n>0$ $\frac{1}{(a(n+1))}\sinh^{(n+1)}ax\cosh ax-\frac{(n+2)}{(n+1)}\int\sinh^{(n+2)}ax\,dx\;for:n<0\,,n\neq-1$
$\int\frac{dx}{(\sinh ax)}=\frac{1}{a}\ln\tanh\frac{ax}{2}+c$
$\int\frac{dx}{(\cosh ax)}=\frac{2}{a}\tan^{-1}e^{ax}+c$
$\int x\sinh ax\,dx=\frac{1}{a}x\cosh ax-\frac{1}{a^2}\sinh ax+c$
$\int x\cosh ax\,dx=\frac{1}{a}x\sinh ax-\frac{1}{a^2}\cosh ax+c$
$\int\tanh ax\,dx=\frac{1}{a}\ln\cosh ax+c$

$\int \coth ax\,dx = \frac{1}{a} \ln \sinh ax + c$
$\int \tanh^2 ax\,dx = x - \frac{(\tanh ax)}{(a)} + c$
$\int \coth^2 ax\,dx = x - \frac{(\coth ax)}{(a)} + c$
$\int \sinh ax \sinh Bx\,dx = \frac{1}{(a^2 - B^2)} (a \sinh Bx \cosh ax - B \cosh Bx \sinh ax) + k$
$\int \cosh ax \cosh Bx\,dx = \frac{1}{(a^2 - B^2)} (a\, shin\, ax \cosh Bx - B \sinh Bx \cosh ax) + k$
$\int \cosh ax \sinh Bx\,dx = \frac{1}{(a^2 - B^2)} (a \sinh Bx \sinh ax - Bcosh\, Bx \cosh ax) + k$

Integrals Containing Exponential Functions

$\int A^{(ax+B)}\,dx = \frac{1}{(a \ln A)} A^{(ax+B)} + k \text{ for } A > 0, A \neq 1$
$\int F(e^{ax})\,dx = \frac{1}{a} \int F(t) \frac{dt}{t}, \text{where } t = e^{ax}$
$\int x e^{ax}\,dx = \frac{(ax-1)}{a^2} e^{ax} + k$
$\int x^2 e^{ax}\,dx = \frac{(a^2 x^2 - 2ax + 2)}{a^3} e^{ax} + k$
$\int x^3 e^{ax}\,dx = \frac{(a^3 x^3 - 3a^2 x^2 + 6\text{ax} - 6)}{a^4} e^{ax} + k$
$\int x^4 e^{ax}\,dx = \frac{(a^4 x^4 - 4a^3 x^3 + 12a^2 x^2 - 24ax + 24)}{a^5} e^{ax} + k$
$\int x^n e^{ax}\,dx = e^{ax} (\frac{x^n}{a} - \frac{(n x^{(n-1)})}{a^2} + \frac{(n(n-1) x^{(n-2)})}{a^3} - .. + (-1)^{(n-1)} \frac{(n! x)}{a^n} + (-1)^n \frac{(n!)}{a^{(n+1)}}) + k$

Integrals Containing Logarithmic Functions

$\int \ln x\, dx = x\ln x - x + c$
$\int (lnx)^2\, dx = x(\ln x)^2 - 2\text{x} \ln x + 2\text{x} + c$
$\int (\ln x)^3\, dx = x(\ln x)^3 - 3\text{x}(\ln x)^2 + 6\text{x} \ln x - 6\text{x} + c$
$\int (\ln x)^n\, dx = x(lnx)^n - n\int (lnx)^{(n-1)} dx\ ,\ for\ n \neq -1$
$\int \frac{dx}{lnx} = \ln(\ln x) + \ln x + \frac{(\ln x)^2}{2.2!} + \frac{(\ln x)^3}{3.3!} + ... + c$
$\int \frac{dx}{(\ln x)^n} = \frac{-x}{[(n-1)(\ln x)^{(n-1)}]} + \frac{1}{(n-1)}\int \frac{dx}{(\ln x)^{(n-1)}}\ ,\ for\ n \neq 1$
$\int x^m \ln x\, dx = x^{(m+1)}[\frac{(\ln x)}{(m+1)} - \frac{1}{(m+1)^2}] + c\ ,\ for\ m \neq -1$
$\int x^m (\ln x)^n\, dx = \frac{[x^{(m+1)}(\ln x)^n]}{(m+1)} - \frac{n}{(m+1)}\int x^m (\ln x)^{(n-1)} dx\ for\ m \neq -1\ ,\ n \neq -1$
$\int \frac{(\ln x)^n}{x} dx = \frac{(\ln x)^{(n+1)}}{(n+1)} + c$

Integrals Containing Inverse Hyperbolic Functions

$\int sh^{-1}\frac{x}{a}\, dx = x\, sh^{-1}\frac{x}{a} - \sqrt{(x^2+a^2)} + k$
$\int \cosh^{-1}\frac{x}{a}\, dx = x\cosh^{-1}\frac{x}{a} - \sqrt{(x^2-a^2)} + k$
$\int \tanh^{-1}\frac{x}{a}\, dx = x\tanh^{-1}\frac{x}{a} + \frac{a}{2}(a^2-x^2) + k$
$\int \coth^{-1}\frac{x}{a}\, dx = x\coth^{-1}\frac{x}{a} + \frac{a}{2}\ln(x^2-a^2) + k$

Some Definite Integrals

$\int_0^\infty e^{(-a^2)} x^2 \, dx = \frac{\sqrt{(\pi)}}{2a} at : a > 0$
$\int_0^\infty x^2 e^{(-a^2)} x^2 \, dx = \frac{\sqrt{(\pi)}}{(4 a^3)} at\ a > 0$
$\int_0^\infty e^{-x} \ln x \, dx \approx -0.5772$
$\int_0^\infty \frac{(\cos ax)}{x} dx = \infty, (\infty - any\,number)$

قد تم سرد بعض أهم التكاملات والتفاضلات الرئيسية فى هذا الموضوع

وسيتم اكمالها فى العدد الثانى وبالاضافة الى بعض القوانين الجبرية الاخرى

والتى تفيد الباحثين فى مجال الرياضيات الهندسية

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