DIFREÁIL (DIFFERENTIATION)

$f(x)$	$f'(x) \equiv \frac{d}{dx}[f(x)]$
x^n	nx^{n-1}
$\ln x$	$\frac{1}{x}$
$\cos x$	$-\sin x$
$\sin x$	$\cos x$
$\tan x$	$\sec^2 x$
$\sec x$	$\sec x \tan x$
$\operatorname{cosec} x$	$-\operatorname{cosec} x \cot x$
$\cot x$	$-\operatorname{cosec}^2 x$
e^x	e^x
e^{ax}	ae^{ax}
a^x	$a^x \ln a$
$\cos^{-1}\frac{x}{a}$	$-\frac{1}{\sqrt{a^2-x^2}}$
$\sin^{-1}\frac{x}{a}$	$\frac{1}{\sqrt{a^2-x^2}}$
$\tan^{-1}\frac{x}{a}$	$\frac{a}{a^2+x^2}$
$\sec^{-1}\frac{x}{a}$	$\frac{a}{x\sqrt{x^2-a^2}}$
$\operatorname{cosec}^{-1}\frac{x}{a}$	$-\frac{a}{x\sqrt{x^2-a^2}}$
$\cot^{-1}\frac{x}{a}$	$-\frac{a}{a^2+x^2}$
$\sinh x$	$\cosh x$
$\cosh x$	$\sinh x$
$\tanh x$	$\operatorname{sech}^2 x$
$\coth x$	$-\operatorname{cosech}^2 x$
$\operatorname{sech} x$	$-\operatorname{sech} x \tanh x$
$\operatorname{cosech} x$	$-\operatorname{cosech} x \coth x$
$\sinh^{-1} x$	$\frac{1}{\sqrt{x^2+1}}$
$\cosh^{-1} x$	$\frac{1}{\sqrt{x^2-1}}$
$\tanh^{-1} x$	$\frac{1}{1-x^2}$

SUIMEÁIL (INTEGRATION)

Glactar $a>0$ agus fágtar tairisigh na suimeála ar lár.

We take $a>0$ and omit constants of integration.

$f(x)$	$\int f(x)\,dx$
$x^n\ (n\neq -1)$	$\frac{x^{n+1}}{n+1}$
$\frac{1}{x}$	$\ln\lvert x\rvert$
$\cos x$	$\sin x$
$\sin x$	$-\cos x$
$\tan x$	$\ln\lvert\sec x\rvert$
$\sec x$	$\ln\lvert\sec x+\tan x\rvert$
$\operatorname{cosec} x$	$\ln\left\lvert\tan\frac{x}{2}\right\rvert$
$\cot x$	$\ln\lvert\sin x\rvert$
e^x	e^x
e^{ax}	$\frac{1}{a}e^{ax}$
a^x	$\frac{a^x}{\ln a}$
$\frac{1}{\sqrt{a^2+x^2}}$	$\ln\left\lvert\frac{x+\sqrt{a^2+x^2}}{a}\right\rvert$
$\frac{1}{\sqrt{a^2-x^2}}$	$\sin^{-1}\frac{x}{a}$
$\frac{1}{x^2+a^2}$	$\frac{1}{a}\tan^{-1}\frac{x}{a}$
$\frac{1}{x\sqrt{x^2-a^2}}$	$\frac{1}{a}\sec^{-1}\frac{x}{a}$
$\frac{1}{\sqrt{x^2-a^2}}$	$\ln\left\lvert\frac{x+\sqrt{x^2-a^2}}{a}\right\rvert$
$\frac{1}{a^2-x^2}$	$\frac{1}{2a}\ln\left\lvert\frac{a+x}{a-x}\right\rvert$

$\coth^{-1} x$	$-\frac{1}{x^2-1}$
$\operatorname{sech}^{-1} x$	$-\frac{1}{x\sqrt{1-x^2}}$
$\operatorname{cosech}^{-1} x$	$-\frac{1}{x\sqrt{x^2+1}}$

Torthaí agus Líonta:
Products and Quotients:

$$y = uv\ ;\ \frac{dy}{dx} = u\frac{dv}{dx}+v\frac{du}{dx}$$

$$y = \frac{u}{v}\ ;\ \frac{dy}{dx} = \frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v^2}$$

Foirmlí áisiúla:
Useful formulae:

$\sinh^{-1} x = \ln\left(x+\sqrt{x^2+1}\right)$ $(-\infty<x<\infty)$

$\cosh^{-1} x = \ln\left(x+\sqrt{x^2-1}\right)$ $(x\geq 1)$

$\tanh^{-1} x = \frac{1}{2}\ln\frac{1+x}{1-x}$ $(-1<x<1)$

$\sinh x$	$\cosh x$
$\cosh x$	$\sinh x$
$\tanh x$	$\ln\cosh x$
$\coth x$	$\ln\lvert\sinh x\rvert$
$\operatorname{sech} x$	$\tan^{-1}(\sinh x)$
$\operatorname{cosech} x$	$\ln\left\lvert\tanh\frac{x}{2}\right\rvert$
$\cos^2 x$	$\frac{1}{2}[x+\frac{1}{2}\sin 2x]$
$\sin^2 x$	$\frac{1}{2}[x-\frac{1}{2}\sin 2x]$
$\cosh^2 x$	$\frac{1}{2}[x+\frac{1}{2}\sinh 2x]$
$\sinh^2 x$	$\frac{1}{2}[-x+\frac{1}{2}\sinh 2x]$
$\frac{1}{x\sqrt{a^2-x^2}}$	$-\frac{1}{a}\operatorname{sech}^{-1}\frac{x}{a}$
$\frac{1}{x\sqrt{x^2+a^2}}$	$-\frac{1}{a}\operatorname{cosech}^{-1}\frac{x}{a}$

Suimeáil trí mhíreanna:
Integration by parts:

$$\int u\,dv = uv - \int v\,du$$

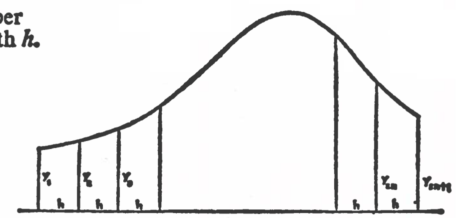
Teoragán Taylor (Taylor's Theorem):

$$f(x+h) = f(x)+hf'(x)+\frac{h^2}{2!}f''(x)+\dots+\frac{h^r}{r!}f^r(x)+\dots$$

Riail Shimpson (Simpson's Rule):

Corr-uimhir ordanáidí iad $y_1, y_2, \dots y_{2n+1}$ fad h óna chéile.

$y_1, y_2, \dots y_{2n+1}$ is an odd number of ordinates at intervals of length h.



Achar (Area) $\approx \frac{1}{3}h\{y_1+y_{2n+1}+2(y_3+y_5+\dots y_{2n-1})+4(y_2+y_4+\dots y_{2n})\}$

$\cos^2 A + \sin^2 A = 1$

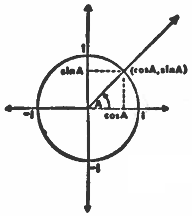
$\tan A = \dfrac{\sin A}{\cos A}$

$\sec^2 A = 1 + \tan^2 A = \dfrac{1}{\cos^2 A}$

$\cot A = \dfrac{1}{\tan A}$

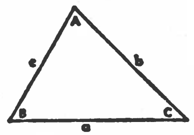
$\sec A = \dfrac{1}{\cos A}$

$\operatorname{cosec} A = \dfrac{1}{\sin A}$



A	0	π	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$
$\cos A$	1	-1	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$
$\sin A$	0	0	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$
$\tan A$	0	0	gan sain-mhíniú not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$

$\cos(-A) = \cos A$ $\quad\sin(-A) = -\sin A$ $\quad\tan(-A) = -\tan A$



Foirmle an tsín:
Sine formula: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Foirmle an chomhshínis:
Cosine formula: $a^2 = b^2 + c^2 - 2bc\cos A$

$\cos(A+B) = \cos A\cos B - \sin A\sin B$

$\sin(A+B) = \sin A\cos B + \cos A\sin B$

$\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}$

$\cos 2A = \dfrac{1-\tan^2 A}{1+\tan^2 A}$

$\cos^2 A = \frac{1}{2}(1+\cos 2A)$

$2\cos A\cos B = \cos(A+B) + \cos(A-B)$

$2\sin A\cos B = \sin(A+B) + \sin(A-B)$

$2\sin A\sin B = \cos(A-B) - \cos(A+B)$

$2\cos A\sin B = \sin(A+B) - \sin(A-B)$

$\cos A + \cos B = 2\cos\dfrac{A+B}{2}\cos\dfrac{A-B}{2}$

$\cos A - \cos B = -2\sin\dfrac{A+B}{2}\sin\dfrac{A-B}{2}$

$\sin A + \sin B = 2\sin\dfrac{A+B}{2}\cos\dfrac{A-B}{2}$

$\sin A - \sin B = 2\cos\dfrac{A+B}{2}\sin\dfrac{A-B}{2}$

$e^{in\theta} = (\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$

$\cos 2A = \cos^2 A - \sin^2 A$

$\sin 2A = 2\sin A\cos A$

$\tan 2A = \dfrac{2\tan A}{1-\tan^2 A}$

$\sin 2A = \dfrac{2\tan A}{1+\tan^2 A}$

$\sin^2 A = \frac{1}{2}(1-\cos 2A)$