$D_x(u+v) = D_x u + D_x v$	$\frac{d}{dx}(x^3 + x^4) = 3x^2 + 4x^3$
$D_x u^n = nu^{n-1} D_x u$	$\frac{d}{dx} x^3 = 3x^2$
Product Rule $D_x(uv) = uD_x v + vD_x u$	$\frac{d}{dx}(x^3 \cdot x^4) = x^3(4x^3) + x^4(3x^2)$
Quotient Rule $D_x\left(\frac{u}{v}\right) = \frac{vD_x u - uD_x v}{v^2}$	$\frac{d}{dx}\left(\frac{x^3}{x^4}\right) = \frac{x^4(3x^2) - x^3(4x^3)}{(x^4)^2}$

$D_x \sin u = \cos u \, D_x u$	$\frac{d}{dx} \sin x = \cos x$ $\frac{d}{dx} \sin x^2 = (\cos x^2)(2x)$
$D_x \cos u = -\sin u \; D_x u$	$\frac{d}{dx} \cos x = -\sin x$ $\frac{d}{dx} \cos x^2 = (-\sin x^2)(2x)$
$D_x \tan u = \sec^2 u \, D_x u$	$\frac{d}{dx} \tan x = \sec^2 x$ $\frac{d}{dx} \tan x^2 = [\sec^2(x^2)](2x)$
$D_x \cot u = -\csc^2 u \, D_x u$	$\frac{d}{dx} \cot x = -\csc^2 x$ $\frac{d}{dx} \cot x^2 = [-\csc^2 x^2](2x)$

$D_x \sec u = \sec u \tan u \, D_x u$	$\frac{d}{dx} \sec x \tan x$ $\frac{d}{dx} \sec x^2 = (\sec x^2 \tan x^2)\,(2x)$
$D_x \csc u = -\csc u \cot u \, D_x u$	$\frac{d}{dx} \csc x = -\csc x \cot x$ $\frac{d}{dx} \csc x^2 = (-\csc x^2 \cot x^2)(2x)$
$D_x \sinh u = \cosh u \;\; D_x u$	$\frac{d}{dx} \sinh x = \cosh x$ $\frac{d}{dx} \sinh x^2 = (\cosh x^2)(2x)$
$\sinh x = \frac{e^x - e^{-x}}{2}$	

$\cosh x = \dfrac{e^x + e^{-x}}{2}$	
$\tanh x = \dfrac{e^x - e^{-x}}{e^x + e^{-x}}$	
$\operatorname{csch} x = \dfrac{2}{e^x - e^{-x}}$	
$\operatorname{sech} x = \dfrac{2}{e^x + e^{-x}}$	

$\coth x = \dfrac{e^x + e^{-x}}{e^x - e^{-x}}$	
$D_x \cosh u = \sinh u \, D_x u$	$\dfrac{d}{dx} \cosh x = \sinh x$ $\dfrac{d}{dx} \cosh x^2 = (\sinh x^2)(2x)$
$D_x \tanh u = \operatorname{sech}^2 u \;\; D_x u$	$\dfrac{d}{dx} \tanh x = \operatorname{sech}^2 x$ $\dfrac{d}{dx} \tanh x^2 = (\operatorname{sech}^2 x^2)(2x)$
$D_x \coth u = -\operatorname{csch}^2 u \, D_x u$	$\dfrac{d}{dx} \coth x = -\operatorname{csch}^2 x$ $\dfrac{d}{dx} \coth x^2 = (-\operatorname{csch}^2 x^2)(2x)$

$D_x \operatorname{sech} u = -\operatorname{sech} u \tanh u \, D_x u$	$\frac{d}{dx} \operatorname{sech} x = -\operatorname{sech} x \tanh x$ $\frac{d}{dx} \operatorname{sech} x^2 = (-\operatorname{sech} x^2 \tanh x^2)(2x)$
$D_x \operatorname{csch} u = -\operatorname{csch} u \coth u \, D_x u$	$\frac{d}{dx} \operatorname{csch} u = -\operatorname{csch} x \coth x$ $\frac{d}{dx} \operatorname{csch} x^2 = (-\operatorname{csch} x^2 \coth x^2)(2x)$
$D_x e^u = e^u D_x u$	$\frac{d}{dx} e^x = e^x$ $\frac{d}{dx} e^{x^2} = e^{x^2}(2x)$
$D_x a^u = a^u \ln a \, D_x u$	$\frac{d}{dx} 3^x = 3^x \ln 3$ $\frac{d}{dx} 3^{x^2} = (3^{x^2} \ln 3)(2x)$

$D_x \log_a u = \frac{D_x u}{u \ln a}$	$\frac{d}{dx} \log_3 x = \frac{1}{x \ln 3}$ $\frac{d}{dx} \log_3 x^2 = \left(\frac{1}{x^2 \ln 3}\right)(2x)$
Change of base formula $\log_b x = \frac{\log x}{\log b} = \frac{\ln x}{\ln b}$	
$D_x \ln u = \frac{D_x u}{u}$	$\frac{d}{dx} \ln x = \frac{1}{x}$ $\frac{d}{dx} \ln x^2 = \left(\frac{1}{x^2}\right)(2x)$
$D_x \sin^{-1} u = \frac{D_x u}{\sqrt{1 - u^2}}$	$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1 - x^2}}$

$D_x \cos^{-1} u = \frac{-D_x u}{\sqrt{1-u^2}}$	$\frac{d}{dx}\cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$
$D_x \tan^{-1} u = \frac{D_x u}{1+u^2}$	$\frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$
$D_x \cot^{-1} u = \frac{-D_x u}{1+u^2}$	$\frac{d}{dx}\cot^{-1} x = \frac{-1}{1+x^2}$
$D_x \sec^{-1} u = \frac{D_x u}{\lvert u\rvert\sqrt{u^2-1}}$	$\frac{d}{dx}\sec^{-1} x = \frac{1}{\lvert x\rvert\sqrt{x^2-1}}$

$D_x \csc^{-1} u = \frac{-D_x u}{\lvert u \rvert \sqrt{u^2 - 1}}$	$\frac{d}{dx} \csc^{-1} x = \frac{-1}{\lvert x \rvert \sqrt{x^2 - 1}}$
$D_x \int_a^u f(t)dt = f(u) D_x u$	$\frac{d}{dx} \int_0^x f(t)\, dt = f(x)$ $\frac{d}{dx} \int_0^{x^2} f(t)dt = [f(x)](2x)$
$\cos^2 \theta + \sin^2 \theta = 1$	
$1 + \tan^2 \theta = \sec^2 \theta$	

$1 + \cot^2\theta = \csc^2\theta$	
$\sin(-\theta) = -\sin(\theta)$	
$\cos(-\theta) = \cos(\theta)$	
$\tan(-\theta) = -\tan(\theta)$	

$\cot(-\theta) = -\cot(\theta)$	
$\sec(-\theta) = \sec(\theta)$	
$\csc(-\theta) = -\csc(\theta)$	
$\sin(2\theta) = 2\sin\theta\cos\theta$	

$\cos(2\theta) = \begin{cases} 2\cos^2\theta - 1 \\ 1 - 2\sin^2\theta \\ \cos^2\theta - \sin^2\theta \end{cases}$	
$\cos^2\theta = \frac{1}{2}(1 + \cos(2\theta))$	
$\sin^2\theta = \frac{1}{2}(1 - \cos(2\theta))$	
$\sin(A + B) = \sin A \cos B + \sin B \cos A$	

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

$\tan(A-B)=\dfrac{\tan A-\tan B}{1+\tan A\tan B}$	
$\sin A\cos B=\dfrac{1}{2}[\sin(A+B)+\sin(A-B)]$	
$\cos A\cos B=\dfrac{1}{2}[\cos(A+B)+\cos(A-B)]$	
$\sin A\sin B=\dfrac{1}{2}[\cos(A-B)-\cos(A+B)]$	

$\cos A \sin B = \frac{1}{2}[\sin(A+B) - \sin(A-B)]$	
$\tan A \tan B = \dfrac{\cos(A-B) - \cos(A+B)}{\cos(A-B) + \cos(A+B)}$	
$\int u^n du = \dfrac{u^{n+1}}{n+1} + C$	$\int x^3 dx = \dfrac{x^4}{4} + C$
$\int \frac{1}{u} du = \ln\lvert u\rvert + C$	$\int \frac{1}{x} dx = \ln\lvert x\rvert + C$

$\int \sin u \, du = -\cos u + C$	$\int \sin x \, dx = -\cos x + C$
$\int \cos u \, du = \sin u + C$	$\int \cos x \, dx = \sin x + C$
$\int \sec^2 u \, du = \tan u + C$	$\int \sec^2 x \, dx = \tan x + C$
$\int \csc^2 u \, du = -\cot u + C$	$\int \csc^2 x \, dx = -\cot x + C$

$\int \sec u \tan u \, du = \sec u + C$	$\int \sec x \tan x \, dx = \sec x + C$
$\int \csc u \cot u \, du = -\csc u + C$	$\int \csc x \cot x \, dx = -\csc x + C$
$\int \tan u \, du = -\ln\|\cos u\| + C$	$\int \tan x \, dx = -\ln\|\cos x\| + C$
$\int \cot u \, du = \ln\|\sin u\| + C$	$\int \cot x \, dx = \ln\|\sin x\| + C$

$\int \sec u \, du = \ln\lvert \sec u + \tan u \rvert + C$	$\int \sec x \, dx = \ln\lvert \sec x + \tan x \rvert + C$
$\int \csc u = \ln\lvert \csc u - \cot u \rvert + C$	$\int \csc x = \ln\lvert \csc x - \cot x \rvert + C$
$\int \frac{1}{\sqrt{a^2 - u^2}} du = \sin^{-1} \frac{u}{a} + C$	$\int \frac{1}{\sqrt{1 - x^2}} dx = \sin^{-1} x + C$ $\int \frac{1}{\sqrt{4 - x^2}} dx = \sin^{-1} \frac{x}{2} + C$ $\int \frac{1}{\sqrt{9 - x^2}} dx = \sin^{-1} \frac{x}{3} + C$
$\int \frac{1}{a^2 + u^2} du = \frac{1}{a} \tan^{-1} \frac{u}{a} + C$	$\int \frac{1}{1 + x^2} dx = \tan^{-1} x + C$ $\int \frac{1}{4 + x^2} dx = \frac{1}{2} \tan^{-1} \frac{x}{2} + C$ $\int \frac{1}{9 + x^2} dx = \frac{1}{3} \tan^{-1} \frac{x}{3} + C$

$\int \frac{1}{u\sqrt{u^2-a^2}}\,du = \frac{1}{a}sec^{-1}\left\lvert\frac{u}{a}\right\rvert + C$	$\int \frac{1}{x\sqrt{x^2-1}}\,dx = sec^{-1}\lvert x\rvert + C$ $\int \frac{1}{x\sqrt{x^2-4}}\,dx = \frac{1}{2}sec^{-1}\left\lvert\frac{x}{2}\right\rvert + C$ $\int \frac{1}{x\sqrt{x^2-9}}\,dx = \frac{1}{3}sec^{-1}\left\lvert\frac{x}{3}\right\rvert + C$
$\int \sinh u\,du = \cosh u + C$	
$\int \cosh u\,du = \sinh u + C$	
$\int sech^2\,u\,du = \tanh u + C$	

$$\int csch^2 u\, du = -cothu + C$$	
$$\int \operatorname{sech} u \tanh u\, du = -\operatorname{sech} u + C$$	
$$\int \operatorname{csch} u \coth u\, du = -\operatorname{csch} u + C$$	
Integration by Parts $$\int u\, dv = uv - \int v\, du$$	

$\int e^u du = e^u + C$	
$\int a^u du = \frac{a^u}{\ln a} + C$	
$\ln AB = \ln A + \ln B$	
$\ln \frac{A}{B} = \ln A - \ln B$	

$\ln x^k = k \ln x$	
Trig Substitution $\sqrt{a^2 - u^2}$ Use $u = a \sin \theta$	
Trig Substitution $\sqrt{a^2 + u^2}$ Use $u = a \tan \theta$	
Trig Substitution $\sqrt{u^2 - a^2}$ Use $u = a \sec \theta$	

Method of Circular Disks $V = \pi \int_a^b [f(x)]^2 dx$	
Method of Circular Rings $V = \pi \int_a^b \{[f(x)]^2 - [g(x)]^2\} dx$ ↓ Top Curve ↓ Bottom Curve ↓ Width	
Method of Cylindrical Shells $V = 2\pi \int_a^b x[f(x)]\, dx$ ↓ **Distance** ↓ **Length** ↓ **Width**	
Arc Length $S = \int_a^b \sqrt{1 + [f'(x)]^2}\, dx$	

Surface Area $S.A. = 2\pi \int_a^b r(x)\sqrt{1+[f'(x)]^2}\,dx$ $\downarrow$ Radius	
Inverse Function Rule $(f^{-1})'(x) = \dfrac{1}{f'[f^{-1}(x)]}$	
Power Series $\dfrac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots = \sum_{k=0}^{\infty} x^k$ For $\|x\| < 1$	
Gregory's Series $\tan^{-1} x = x - \dfrac{x^3}{3} + \dfrac{x^5}{5} - \dfrac{x^7}{7} + \cdots = \sum_{k=0}^{\infty} \dfrac{(-1)^k x^{2k+1}}{2k+1}$ For $\|x\| < 1$	

$e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$	
$\sin x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k+1)!} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$	
$\cos x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{(2k)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$	
$\ln(1+x) = \sum_{k=0}^{\infty} \frac{(-1)^k x^{k+1}}{k+1} = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$	