Tabla de Derivadas

Tipos	Formas: Función Simple	Formas: Función Compuesta
Constante	$\frac{d}{dx}(K)=0 \quad \forall k\in\mathbb{R}$	
Potencial	$\frac{d}{dx}(x^a)=a\cdot x^{a-1}$	$\frac{d}{dx}(u^a)=a\cdot u^{a-1}\cdot u'$
Raíz Cuadrada	$\frac{d}{dx}(\sqrt{x})=\frac{1}{2\sqrt{x}}$	$\frac{d}{dx}(\sqrt{u})=\frac{u'}{2\sqrt{u}}$
Logarítmica	$\frac{d}{dx}(\ln x)=\frac{1}{x}$ $\quad \frac{d}{dx}(\log_a x)=\frac{1}{\ln a}\cdot\frac{1}{x}$	$\frac{d}{dx}(\ln u)=\frac{u'}{u}$ $\quad \frac{d}{dx}(\log_a u)=\frac{1}{\ln a}\cdot\frac{u'}{u}$
Exponencial	$\frac{d}{dx}(e^x)=e^x$ $\quad \frac{d}{dx}(a^x)=a^x\cdot\ln a$	$\frac{d}{dx}(e^u)=e^u\cdot u'$ $\quad \frac{d}{dx}(a^u)=a^u\cdot u'\cdot\ln a$
Seno	$\frac{d}{dx}[sen(x)]=\cos(x)$	$\frac{d}{dx}[sen(u)]=\cos(u)\cdot u'$
Coseno	$\frac{d}{dx}[\cos(x)]=-sen(x)$	$\frac{d}{dx}[\cos(u)]=-sen(u)\cdot u'$
Tangente	$\frac{d}{dx}[tg(x)]=1+tg^2x$ $\quad \frac{d}{dx}[tg(x)]=\frac{1}{\cos^2 x}$	$\frac{d}{dx}[tg(u)]=[1+tg^2(u)]\cdot u'$ $\quad \frac{d}{dx}[tg(u)]=\frac{u'}{\cos^2 u}$
Cotangente	$\frac{d}{dx}[cotg(x)]=\frac{-1}{sen^2x}$ $\frac{d}{dx}[cotg(x)]=-[1+ctg^2(x)]=-Cosec^2(x)$	$\frac{d}{dx}[ctg(u)]=\frac{-u'}{sen^2u}$ $\frac{d}{dx}(ctg(u))=-[1+ctg^2(u)]\cdot u'=-Cosec^2(u)\cdot u'$
Secante	$\frac{d}{dx}[Sec(x)]=Sec(x)\cdot tg(x)$	$\frac{d}{dx}[Sec(u)]=Sec(u)\cdot tg(u)\cdot u'$
Cosecante	$\frac{d}{dx}[Cosec(x)]=-Cosec(x)\cdot Cotg(x)$	$\frac{d}{dx}[Cosec(u)]=-Cosec(u)\cdot Cotg(u)\cdot u'$
Cotangente	$\frac{d}{dx}[cotg(x)]=-Cosec^2(x)$	$\frac{d}{dx}[cotg(u)]=-Cosec^2(u)\cdot u'$
Arco Seno	$\frac{d}{dx}[Arcsen(x)]=\frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}[Arcsen(u)]=\frac{u'}{\sqrt{1-u^2}}$
Arco Coseno	$\frac{d}{dx}[Arc\cos(x)]=\frac{-1}{\sqrt{1-x^2}}$	$\frac{d}{dx}[Arc\cos(u)]=\frac{-u'}{\sqrt{1-u^2}}$
Arco Tangente	$\frac{d}{dx}[Arctg(x)]=\frac{1}{1+x^2}$	$\frac{d}{dx}[Arctg(u)]=\frac{u'}{1+u^2}$
Arco Cotangente	$\frac{d}{dx}[Arccotg(x)]=\frac{-1}{1+x^2}$	$\frac{d}{dx}[Arccotg(u)]=\frac{-u'}{1+u^2}$

Operaciones	Suma:	Producto:	Cociente:
	$\frac{d}{dx}(f+g)=f'+g'$	$\frac{d}{dx}(f\cdot g)=f'\cdot g+f\cdot g'$	$\frac{d}{dx}\left(\frac{f}{g}\right)=\frac{f'\cdot g-f\cdot g'}{g^2}$

Derivación Logarítmica

Sea $f(x)=[g(x)]^{h(x)}$

Aplicamos logaritmos en ambos lados de la igualdad:

$$\ln[f(x)]=\ln[g(x)]^{h(x)}=h(x)\cdot\ln[g(x)]$$

Después derivamos: $\frac{f'(x)}{f(x)}=h'(x)\cdot\ln[g(x)]+h(x)\cdot\frac{g'(x)}{g(x)}$

Despejamos f´(x): $f'(x)=f(x)\cdot\left(h'(x)\cdot\ln[g(x)]+h(x)\cdot\frac{g'(x)}{g(x)}\right)$

Por último sustituimos f(x) por su valor:

$$f'(x)=[g(x)]^{h(x)}\cdot\left(h'(x)\cdot\ln[g(x)]+h(x)\cdot\frac{g'(x)}{g(x)}\right)$$

Ejemplo

Sea $f(x)=x^{2x+1}$

Aplicamos logaritmos:

$$\ln[f(x)]=(2x+1)\cdot\ln x$$

Derivamos:

$$\frac{f'(x)}{f(x)}=2\ln x+\frac{(2x+1)\cdot 1}{x}$$

Despejamos:

$$f'(x)=f(x)\cdot 2\ln x+\frac{(2x+1)\cdot 1}{x}$$

Sustituimos:

$$f'(x)=x^{2x+1}\left(2\ln x+\frac{2x+1}{x}\right)$$