Fórmulas de derivación

a, c, n =constantes; u, v, x =variables o expresiones algebraicas

Método de los cuatro pasos

$$\frac{d}{dx}f(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x)-f(x)}{\Delta x}$$

Fórmulas básicas

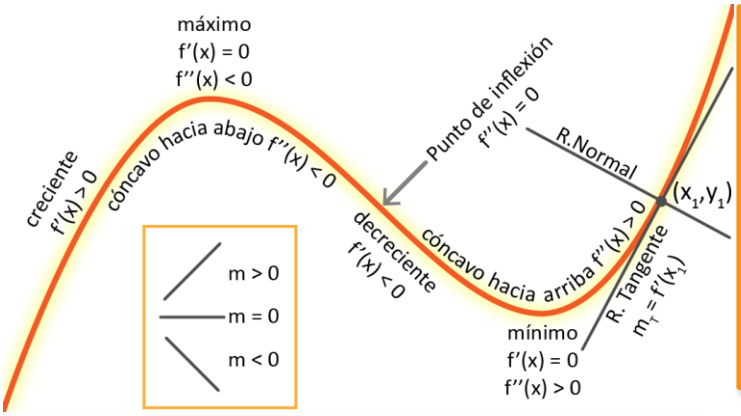
1. $\frac{d}{dx}c = 0$
2. $\frac{d}{dx}x = 1$
3. $\frac{d}{dx}(u \pm v) = \frac{d}{dx}u \pm \frac{d}{dx}v$
4. $\frac{d}{dx}(c \cdot v) = c\frac{d}{dx}v$
5. $\frac{d}{dx}v^n = n \cdot v^{n-1} \cdot \frac{d}{dx}v$
6. $\frac{d}{dx}(u \cdot v) = u\frac{d}{dx}v + v\frac{d}{dx}u$
7. $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{d}{dx}u - u\frac{d}{dx}v}{v^2}$
8. $\frac{d}{dx}\sqrt{v} = \frac{\frac{d}{dx}v}{2\sqrt{v}}$

Trascendentes

9. $\frac{d}{dx}\ln(v) = \frac{\frac{d}{dx}v}{v}$
10. $\frac{d}{dx}\log_a(v) = \frac{\frac{d}{dx}v}{v \cdot \ln(a)}$
11. $\frac{d}{dx}a^v = a^v \cdot \ln(a) \cdot \frac{d}{dx}v$
12. $\frac{d}{dx}e^v = e^v \cdot \frac{d}{dx}v$
13. $\frac{d}{dx}\operatorname{sen}(v) = \cos(v) \cdot \frac{d}{dx}v$
14. $\frac{d}{dx}\cos(v) = -\operatorname{sen}(v) \cdot \frac{d}{dx}v$
15. $\frac{d}{dx}\tan(v) = \sec^2(v) \cdot \frac{d}{dx}v$
16. $\frac{d}{dx}\csc(v) = -\csc(v)\cot(v) \cdot \frac{d}{dx}v$
17. $\frac{d}{dx}\sec(v) = \sec(v)\tan(v) \cdot \frac{d}{dx}v$
18. $\frac{d}{dx}\cot(v) = -\csc^2(v) \cdot \frac{d}{dx}v$
19. $\frac{d}{dx}\operatorname{sen}^{-1}(v) = \frac{\frac{d}{dx}v}{\sqrt{1-v^2}}$
20. $\frac{d}{dx}\cos^{-1}(v) = -\frac{\frac{d}{dx}v}{\sqrt{1-v^2}}$
21. $\frac{d}{dx}\tan^{-1}(v) = \frac{\frac{d}{dx}v}{1+v^2}$
22. $\frac{d}{dx}\csc^{-1}(v) = -\frac{\frac{d}{dx}v}{v\sqrt{v^2-1}}$
23. $\frac{d}{dx}\sec^{-1}(v) = \frac{\frac{d}{dx}v}{v\sqrt{v^2-1}}$
24. $\frac{d}{dx}\cot^{-1}(v) = -\frac{\frac{d}{dx}v}{1+v^2}$

Regla de la cadena

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$



Sugerencias algebraicas

$\frac{ax}{b} = \frac{a}{b}x$ $\quad \sqrt{x}\sqrt{x} = x$ $\quad x^{\frac{3}{2}} = x\sqrt{x}$

$\sqrt{x} = x^{\frac{1}{2}}$ $\quad \sqrt[3]{x} = x^{\frac{1}{3}}$ $\quad \sqrt[n]{x^m} = x^{\frac{m}{n}}$

$x^{-n} = \frac{1}{x^n}$ $\quad x^n = \frac{1}{x^{-n}}$ $\quad \frac{a}{bx} = \frac{a}{b}x^{-1}$

Otras cosas útiles

Recta punto-pendiente: $y - y_1 = m(x - x_1)$

Pendiente de la Normal: $m_N = -\frac{1}{m_t}$

Ángulo entre dos rectas: $\theta = \tan^{-1}\left(\frac{m_2 - m_1}{1 + m_1 \cdot m_2}\right)$

Longitud de la subtangente $= \frac{y_1}{m_t}$

Longitud de la subnormal $= y_1 \cdot m_t$

Ángulos Notables

θ Deg	θ Rad	sen θ	cos θ	tan θ
0°	0	0	1	0
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	$\frac{\pi}{2}$	1	0	∞

Fórmulas de Integración

a, b, c, n =constantes; u, v, x =variables o expresiones algebraicas

Básicas

1. $\int (u \pm v)dx = \int u\,dx \pm \int v\,dx$
2. $\int a\,dv = a\int dv$
3. $\int dx = x + c$
4. $\int v^n dv = \frac{v^{n+1}}{n+1} + c;\ n \neq -1$
5. $\int \frac{dv}{v} = \ln|v| + c$

Trascendentes

6. $\int a^v dv = \frac{a^v}{\ln a} + c$
7. $\int e^v dv = e^v + c$
8. $\int \operatorname{sen}(v)\,dv = -\cos(v) + c$
9. $\int \cos(v)\,dv = \operatorname{sen}(v) + c$
10. $\int \sec^2(v)\,dv = \tan(v) + c$
11. $\int \csc^2(v)\,dv = -\cot(v) + c$
12. $\int \sec(v)\tan(v)\,dv = \sec(v) + c$
13. $\int \csc(v)\cot(v)\,dv = -\csc(v) + c$
14. $\int \tan(v)\,dv = \ln|\sec(v)| + c$
15. $\int \cot(v)\,dv = \ln|\operatorname{sen}(v)| + c$
16. $\int \sec(v)\,dv = \ln|\sec(v) + \tan(v)| + c$
17. $\int \csc(v)\,dv = \ln|\csc(v) - \cot(v)| + c$
18. $\int \frac{dv}{\sqrt{a^2-v^2}} = \operatorname{sen}^{-1}\left(\frac{v}{a}\right) + c$
19. $\int \frac{dv}{a^2+v^2} = \frac{1}{a}\tan^{-1}\left(\frac{v}{a}\right) + c$
20. $\int \frac{dv}{v\sqrt{v^2-a^2}} = \frac{1}{a}\sec^{-1}\left(\frac{v}{a}\right) + c$
21. $\int \frac{dv}{a^2-v^2} = \frac{1}{2a}\ln\left|\frac{v+a}{v-a}\right| + c$
22. $\int \frac{dv}{v^2-a^2} = \frac{1}{2a}\ln\left|\frac{v-a}{v+a}\right| + c$

Integración por partes

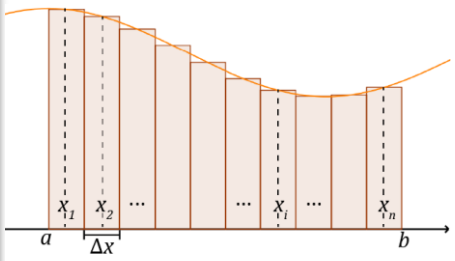
23. $\int u\,dv = uv - \int v\,du$

Integral definida y Teorema Fundamental del Cálculo

24. $\int_a^b f(x)dx = \lim_{n\to\infty} \sum_{i=1}^n f(x_i^*)\Delta x$
    - $\Delta x = \frac{b-a}{n}$
    - $x_i = a + i \cdot \Delta x$
25. $\int_a^b f(x)dx = F(b) - F(a)$

Sustitución trigonométrica

Expresión	Sustitución	Identidad
$\sqrt{a^2 - v^2}$	$v = a\operatorname{sen}\theta;\ -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$	$1 - \operatorname{sen}^2\theta = \cos^2\theta$
$\sqrt{a^2 + v^2}$	$v = a\tan\theta;\ -\frac{\pi}{2} < \theta < \frac{\pi}{2}$	$1 + \tan^2\theta = \sec^2\theta$
$\sqrt{v^2 - a^2}$	$v = a\sec\theta;\ 0 \le \theta < \frac{\pi}{2}$ ó $\pi \le \theta < \frac{3\pi}{2}$	$\sec^2\theta - 1 = \tan^2\theta$



Progresiones

Aritméticas

$a_n = a_1 + (n-1)r$

$S_n = \frac{n(a_1+a_n)}{2}$

$\bar{x} = \sum_{i=1}^n \left(\frac{a_i}{n}\right) = \frac{a_1+a_n}{2}$

Geométricas

$a_n = a_1 \cdot r^{n-1}$

$S_n = \frac{r\cdot a_n - a_1}{r-1}$

$\bar{x} = \sqrt[n]{\prod_{i=1}^n (a_i)} = a_1 \cdot \sqrt{r^{n-1}}$

Interés compuesto

$C = c(1+r)^t$

Geométricas infinitas

$S = \frac{a_1}{1-r}$

Notación sigma

$\sum_{i=1}^n c = nc \qquad \sum_{i=1}^n ca_i = c\sum_{i=1}^n a_i$

$\sum_{i=1}^n (a_i \pm b_i) = \sum_{i=1}^n (a_i) \pm \sum_{i=1}^n (b_i)$

$\sum_{i=1}^n (i) = \frac{n(n+1)}{2}$

$\sum_{i=1}^n (i^2) = \frac{n(n+1)(2n+1)}{6}$

$\sum_{i=1}^n (i^3) = \left[\frac{n(n+1)}{2}\right]^2$